MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

APPLICATIONS OF DIFFERENTIATION

SOLVED EXAMPLES

1. The apporoximate value of $\frac{1}{\sqrt[4]{16.16}}$ is

A. 0.1999

B. 4.0008

C. 0.49875

D. 0.4983

Answer: C

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2. A circular plate expands when heated from a radius of 5 cm to 5.06 cm. The percentage increase in area is

A. 2.4

B. 0.72

C. 0.4

D. 0.6

Answer: A

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3. If the radius of a sphere is raised from 10 cm to 10.02 cm when heated, then the approximate change in the volume is

A. 8 π cubic cm

B. 80 π cubic cm

C. 0.06 π cubic cm

D. 16 π cubic cm

Answer: A

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4. The equation of the normal to the cuve $y = x^3 - 2x^2 + 4$ at x = 2 is

A. x + 4y = 18

B. x - 4y = 18

C. x + 4y +18 = 0

D. x - 4y + 18 = 0

Answer: A

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5. The point on the curve $y = x^3 + 5$, the tangent at which is parallel to the line 12x - y = 7 is

A. (1,0),(-1,-4)

B. (0,-1),(-2,3)

C. (2,13),(-2,-3)

D. (1.2),(1,-2)

Answer: C

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6. The equation of the normal to the curve $y = 2x^3 + 6x^2 - 9$ where the curve crosses the y-axis is

A. x = 9

B. x = 1

C. y + 9 = 0

D. y - 9 = 0

Answer: C

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7. If θ is the angle between the curves $y = x^2, x = y^2$ at (1,1), than tan θ =

A. 3

B. $3/4$

C. $3/5$

D. $5/14$

Answer: B

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8. The length of the subnormal to the cuve $y = x^3$ at (1,1) is

A. 3

B. 16

C. 24

D. 8

Answer: A

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9. A stone projected vertically upward moves according to the law s = $100t - 16t^2$. The maximum height reached is

A. $520/3$ unit

B. $625/4$ unit

C. 653 unit

D. 560 unit

Answer: B

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10. A particle moves according to law $s = t^3 - 3t^2 + 3t + 12.$

The velocity when the acceleration is zero is

A. $10unit / \sec$

B. 0

C. $8/3$ unit/sec

D. $= 3\text{unit}/\sec$

Answer: B

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11. A person of height 2mt starts from a lamp post of height 5 mt and walks away at the constant rate of 6 km per hour. The rate at which his shadow inceases is

A. 2 kmph

B. 6.4 kmph

C. $8/3$ kmph

D. 4 kmph

Answer: D

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12. The function $f(x) = 9x^2 - 15x - x^3 + 10$ is increasing in

A. $(2/2, \infty)$

B. (1,5)

C. $(2/3, 5)$

D. $(2/3, 3/2)$

Answer: B

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13. The function $f(x) = 10 - 3x^3 + x$ is decreasing in

A. $(-5/4, \infty)$

B. $(2/3, 3/2)$

C. $(-1/3, 1/3)$

D. R-$[-1/3, 1/3]$

Answer: D

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14. The stationary point of $3x^4 - 4x^3 + 1$ is

A. (1,0)

B. (1,29)

C. (1,1)

D. none

Answer: A

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15. The minimum value of $x^3 - 6x^2 + 9x + 1$ is

A. 1

B. 2

C. 8

D. 4

Answer: A

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16. Maximum point of $f(x) = \cos ec\, x$ in $(-\pi, 0)$ is

A. $x = -\pi/2$

B. $x = -\pi/3$

C. $x = -\pi/4$

D. none

Answer: A

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17. If the line ax + by + c = 0 is a normal to the curve xy = 1 then

A. a gt 0, b lt 0

B. a gt 0, b gt 0

C. a gt b = 0

D. a lt 0, b lt 0

Answer: A

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18. A particle is moving on a straight line so that its distance s from a fixed point at any time t is proportional to t^n. If v be the velocity and 'a' the acceleration at any time , then $\frac{nas}{n-1}$ equals

A. v

B. v^2

C. v^3

D. 2v

Answer: B

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19. A body whose mass is 3kgs, performs rectilinear motion according to the formula $s = 1 + t + t^2$ (s is in cm, and t is in seconds). Then the kinetic energy of the body when $t = 5$ is

A. $181 \cdot 15$ ergs

B. $181 \cdot 5 \times 10^2$ ergs

C. $181 \cdot 5 \times 10^3$ ergs

D. $181 \cdot 5 \times 10^4$ ergs

Answer: C

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20. If $-4 \leq x \leq 4$ then the critical points of $f(x) = x^2 - 6(|x|) + 4$ are

A. 3,-2

B. 6,-6

C. 0,1

D. 3,-3,0

Answer: D

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EXERCISE 1A (APPROXIMATIONS AND ERRORS)

1. If $f(x) = 2x^2 + 3x - 5$, $x = 3$, $\delta x = 0.02$, then δf=

A. 0.3008

B. 0.3

C. 0.308

D. 0.8

Answer: A

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2. If $f(x) - 1/x, x = 1, \delta x = 0.02, \text{ then } \delta f =$

A. 0.02

B. -0.02

C. 0.0196

D. -0.0196

Answer: D

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3. If $f(x) = \log x, x = 2, \delta x = 0.02,$ then df=

A. log(1.01)

B. 0.01

C. $= -LOG(1.01)$

D. -0.01

Answer: B

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4. If $f(x) = 1/x, x = 2, \delta x = 0.2,$ then df=

A. 0.02

B. -0.02

C. `0.05

D. -0.05

Answer: D

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5. If $f(x) = 1/x^2, x = 2, \delta = -0.01,$ then df=

A. 0.002519

B. 0.002915

C. 0.0025

D. 0.0019

Answer: C

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6. The approximate change in y, when $y = x^2 + 2x, x = 3, \delta = 0 \cdot 01$ is

A. 3.6

B. 2

C. 0.08

D. 0.3

Answer: C

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7. The approximate change in y, when $y = 1/x^2, x = 1, \delta x = -0 \cdot 01$ is

A. 0.02

B. -0.02

C. 0.05

D. -0.05

Answer: A

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8. The approximate vlue of $(2 \cdot 001)^4$ is

A. 27.54

B. 16.032

C. 2.9907

D. 5.0133

Answer: B

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9. The approximate value of $(3 \cdot 02)^5$ is

A. 128.75

B. 16.32

C. 251.1

D. 210.38

Answer: C

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10. The approximate value of $(1 \cdot 0002)^{3000}$ is

A. 1.2

B. 1.4

C. 1.6

D. 1.8

Answer: C

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11. The value of $(127)^{1/3}$ to 4decmal places is

A. 5.0267

B. 5.4267

C. 5.5267

D. 5.0001

Answer: A

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12. The approximate value of $\sqrt[4]{80}$ is

A. 27.54

B. 16.032

C. 2.9907

D. 5.0133

Answer: C

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13. The approximate value of $\frac{1}{\sqrt{25 \cdot 25}}$ is

A. 0.1999

B. 4.0008

C. 0.49875

D. 0.4983

Answer: A

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14. The approximate value of $\frac{1}{\sqrt[3]{8 \cdot 08}}$ is

A. 0.1999

B. 4.0008

C. 0.49875

D. 0.4983

Answer: D

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15. The approximate value of log(2.01), given that log 2 = 0.6934 is

A. 0.6984

B. 0.49974

C. 1.6834

D. 1.6683

Answer: A

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16. The approximate value of $\sin 30^\circ 1'$, given that 1° = 0.01745 radian is

A. 1.00832

B. 0.50025

C. 0.00362

D. 1.00058

Answer: B

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17. The approximate value of $\cos 60^\circ$, given that 1° = 0.01745 radian is

A. 1.0349

B. 0.7193

C. 0.4849

D. 1.00058

Answer: C

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18. If $1^{0} = \alpha$ radians, then find the approximate value of $\cos 60^{0} 1'$.

A. $\frac{1}{2} + \frac{\alpha\sqrt{3}}{120}$

B. $\frac{1}{2} - \frac{\alpha}{120}$

C. $\frac{1}{2} - \frac{\alpha\sqrt{3}}{120}$

D. $\frac{1}{2} + \frac{\alpha}{120}$

Answer: C

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19. The approximate value of tan 45° 1^', given that 1° = 0.01745 radian is

A. 1.0349

B. 0.7193

C. 0.4849

D. 1.00058

Answer: D

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20. How many times of relative error in I is the relative error in T, when T $=2\pi\sqrt{l/g}$

A. 2

B. 3

C. 4

D. 5

Answer: A

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21. If an error of 0.02 cm is made while measuring the radius 10 cm of a circle, then the error in the area is

A. 0.02π sq.cm

B. 4.4π sq.cm

C. 0.4π sq.cm

D. 0.6π sq.cm

Answer: C

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22. IF an error of 0.01 cm is made while measuring the radius 2 cm of a circle, then the relative error in the circumference is

A. 0.004

B. 0.4

C. 0.005

D. 0.5

Answer: C

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23. IF an error of 0.01 cm is made while measuring the radius 5 cm of a circle, then the percentage error in the circumference is

A. 0.2

B. 0.02

C. 0.002

D. 0.0002

Answer: A

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24. If there is an error of 0.02 sq.cm is made in the area of a circle while measuring the radius 5 cm, then the percentage error in the circumference of the circle is

A. $\frac{0.4}{\pi}$

B. $\frac{0.04}{\pi}$

C. $\frac{4}{\pi}$

D. $\frac{0.004}{\pi}$

Answer: B

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25. A circular plate expands when heated from a radius of 5 cm to 5.06 cm. The approximate increase in area is

A. 2.4π sq.cm

B. 0.72π sq.cm

C. 0.4π sq.cm

D. 0.6π sq.cm

Answer: D

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26. The diameter x of a circle is found by measurement to be 5 cm with maximum error is 0.05 cm. The approximate maximum error in the area is

A. 0.125π sq.cm

B. 0.72π sq.cm

C. 0.05π sq.cm

D. 0.04π sq.cm

Answer: A

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27. The diameter x of a circle is found by measurement to be 5 cm with maximum error of 0.05 cm. The relative error in the area is

A. 2

B. 0.02

C. 0.002

D. 0.0002

Answer: B

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28. The circumference of a circle is measured as 56 cm with error 0.02 cm. The percentage error in its area is

A. $1/7$

B. $1/28$

C. $1/14$

D. $1/56$

Answer: C

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29. In measuring the circumference of a circle , there is an error of 0.05 cm. If with this error the circumference of the circle is measured in c cm, then the error in area is

A. $\dfrac{0.025c}{\pi}$ sq.cm

B. $\dfrac{0.25c}{\pi}$ sq.cm

C. $\frac{0.0025c}{\pi}$ sq.cm

D. none

Answer: A

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30. In measuring the circumference of a circle, there is an error of 0.05 cm. If with this error the circumference of the circle is measured in c cm, then the percentage error in area is

A. $\frac{0.1}{c}$

B. $\frac{0.01}{c}$

C. $\frac{0.001}{c}$

D. $\frac{10}{c}$

Answer: D

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31. The circumference of a circle is measured as 14 cm with an error of 0.01 cm. The approximate percentage error in the area of the circle is

A. $3/10$

B. $1/8$

C. $1/7$

D. $3/2$

Answer: C

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32. In measuring the area of a circle in 25π sq.cm, there is an error of 0.02π sq.cm. The percentage error in its circumference is

A. 0.04

B. 0.02

C. 0.01

D. 0.05

Answer: A

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33. In measuring the vertical angle of the sector of a circle of radius 30 cms, an error of 1° is made. The error in the area of the sector is

A. 2.5π sq.cms.

B. 25π sq.cms.

C. 3π sq.cms.

D. 30π sq.cms.

Answer: A

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34. If an error of 0.02 cm is made while measuring the radius 10 cm of a sphere, then the error in the volume is

A. 8 π cubic cm

B. 80 π cubic cm

C. 0.06 π cubic cm

D. 16 π cubic cm

Answer: A

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35. If there is a possible error of 0.02 cm in the measurement of the diameter of a sphere then the possible percentage error in tits volume when the radius 10 cm is

A. 0.1

B. 0.2

C. 0.3

D. 0.4

Answer: C

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36. There is an error of ± 0.04 cm in the measurement of the diameter of a sphere. When the radius is 10 cm, the percentage error in the volume of the sphere is :

A. ± 1.2

B. ± 1.0

C. ± 0.8

D. ± 0.6

Answer: D

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37. If there is an error of $\frac{1}{10}\%$ in the measurement of the radius of a sphere, then the percentage erro in the calculation of the volume of the sphere is

A. $3/10$

B. $1/8$

C. $1/7$

D. $3/2$

Answer: A

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38. If the radius of a sphere is raised from 10 cm to 10.02 cm when heated, then the percentage increase in volume is

A. 0.2

B. 0.6

C. 0.05

D. $\pi / 10$

Answer: B

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39. The radius of a sphere is 3 cm. If an error of 0.03 cm is made in measiring the radius of the sphere, then the percentage error in surface area is

A. 0.125π sq.cm

B. 0.72π sq.cm

C. $.0.05\pi$ sq.cm

D. 0.04π sq.cm

Answer: B

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40. The radius of a sphere is 3 cm. If an error of 0.03 cm is made in measiring the radius of the sphere, then the percentage error in surface area is

A. 2

B. 0.02

C. 0.002

D. 0.0002

Answer: A

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41. If there is an error of 0.01 cm in the diameter of a sphere when its radius 5 cm, then the percentage error in its surface area is

A. 0.2

B. 0.6

C. 0.05

D. $\pi / 10$

Answer: A

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42. If there is a possible error of 0.01 cm in the measurement of side of a cube, the possible error in its surface area when the side is 10 cm is

A. 1.2 sq.cm

B. 1.4 sq.cm

C. 2.4 sq.cm

D. 3.6 sq.cm

Answer: A

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43. If there is an error Of 0.02 cm in the measurement of the side as 10 cm of a cube, then error in the surface area is

A. 1.2 sq.cm

B. 1.4 sq.cm

C. 2.4 sq.cm

D. 3.6 sq.cm

Answer: C

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44. If there is an error of 0.05 cm is made while measuring the side 10 cm of a cube, then the error in the volume is

A. 10 cubic cm

B. 12 cubic cm

C. 15 cubic cm

D. 20 cubic cm

Answer: C

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45. If there is an error of 0.05 cm in the measurement of the side as 2 cm of a cube, then relative error in the volume is

A. 0.075

B. 0.0075

C. 7.5

D. 0.75

Answer: A

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46. The percentage error in measuring the side of a cube is 0.5, Then the percentage error in its volume is

A. $1/2$

B. 1

C. $3/2$

D. 2

Answer: C

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47. In a cube the percentage increase in the side is 1. The percentage increase in volume of cube is

A. 2

B. $1/2$

C. $1/3$

D. 3

Answer: D

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48. The approximate percentage reduction in the volume of a cube of ice if each side of ice cube is reduced by 0.7 percentage due to melting is

A. 2.1

B. 2.5

C. 3.2

D. 3.3

Answer: A

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49. If the side if a cube is 10.01 cm, the approximate volume of the cube is

A. 103 cubic cm

B. 1003 cubic cm

C. 110 cubic cm

D. 1010 cubic cm

Answer: B

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50. If there is an error 0.01 cm in the measurement of the radius 10 cm of a cylinder of fixed height 20 cm then error in the volume is

A. 4 π cubic cm

B. 2.5 π cubic cm

C. 0.06 cubic cm

D. 0.6 cubic cm

Answer: A

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51. If ther is an error 0.01 cm in the measurement of the radius 10 cm of a cylinder of fixed height 20 cm then percentage error in the volume is

A. 0.2

B. 0.02

C. 0.002

D. 0.0002

Answer: A

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52. The radius and height of a cylinder are measured as 5 cm and 10 cm respectively and there is an error of 0.02 cm in the both measurements. The approximate error in the volume is

A. 4 π cubic cm

B. 2.5 π cubic cm

C. 0.06 π cubic cm

D. 0.6 π cubic cm

Answer: B

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53. The radius and height of a cylinder are measured as 5 cm and 10 cm respectively and there is an error of 0.02 cm in both the measurements. The percentage error in volume is

A. 1

B. 0.01

C. 0.001

D. -1

Answer: A

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54. The radius and height of a cone are measured as 6 cm and 12 cm respectively and there is an error of 0.06 cm in both the measurements. The approximate ewrror in the volume of the cone is

A. 410 $\pi\sqrt{2}$ sq.cm

B. 60 π sq.cm

C. 3.6 π sq.cm

D. $320\,\pi\sqrt{2}$ sq.cm

Answer: C

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55. If errors of 1% each are made in te base radius and height of a cylinder, then the percentage error in its volume, is

A. 1

B. 2

C. 3

D. none

Answer: C

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56. The semi-vertical angle of a cone is 45° . If the height of the cone is 20.025, then its approximate laternal surface area, is

A. 410 $\pi\sqrt{2}$ sq.cm

B. 60 π sq.cm

C. 3.6 π sq.cm

D. 9045π sq.cm

Answer: A

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57. The semi vertical angle of a cone is 45°. The height of the cone is 30.05 cm. The approximately its volume is

A. 410 $\pi\sqrt{2}$ sq.cm

B. 60 π sq.cm

C. 3.6 π sq.cm

D. 9045π sq.cm

Answer: D

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58. If there is an error of 0.05 cm, while measuring the side of an equilateral triangle as 5 cm, then the percnetage error in area is

A. $2/3$

B. $1/3$

C. 2

D. 1

Answer: C

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59. The angle A of $\triangle ABC$ is found by measurement to be 63° and the area is calculated by the formula $\frac{1}{2}bc\sin A$. The percentage error in the calculated value of the area due to an error of 15 minutes in the measured value of A is

A. $\frac{5\pi}{54}\cot 47^\circ$

B. $\frac{\pi bc}{1440}\cos 63^\circ$

C. $\frac{5\pi}{36} \cot 63^{\circ}$

D. $\frac{\pi bc}{1120} \cos 42^{\circ}$

Answer: C

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60. In $\triangle ABC$ the sides b, c are given. If there is an error δA in increasing angle A then $\delta =$

A. $\frac{\triangle}{2a} \cdot \delta A$

B. $\frac{2 \triangle}{a} \delta A$

C. $bc \sin A \cdot \delta A$

D. none

Answer: B

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61. If the area of $\triangle ABC$ is calculated from the measurements of b, c, A and k is the error in A, then the percentage error in area is

A. 95 k cot A

B. 100 k cot A

C. 110 k cot A

D. 111 k cot A

Answer: B

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62. If in a triangle the side a and the angle A remain constant, while other elements are changed slightly then

A. $\delta b \sin B + \delta c \sin C = 0$

B. $\delta b \cos B + \delta c \cos C = 0$

C. $\delta b \sec B + \delta c \sec C = 0$

D. $\delta b \cos ecB + \delta c \cos ecC = 0$

Answer: C

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63. If the length of a simple pendulum is decreased by 3%, then the percentage error in its period T is

A. 2

B. 2.5

C. 1.8

D. 1.5

Answer: D

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64. If there is an error of 2% in measuring its length, of a simple pendulum then the percentage error in the period will be

A. 1

B. -1

C. 2

D. 4

Answer: A

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65. Given PV=C (constant). The percentage of increase in V corresponding to an increase 1% in the value of P is

A. 0

B. 1

C. -1

D. 2

Answer: C

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66. The pressure P and the volume v of a gas are connected by the relation $pv^{1/4} = a$ constant. The percentage increase in the pressure corresponding to a diminution of $\frac{1}{2}\%$ in the volume is

A. $1/2$

B. $1/4$

C. 4

D. $1/8$

Answer: D

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67. The focal length of a mirror is given by $\frac{2}{f} = \frac{1}{v} = -\frac{1}{u}$. In finding the values of u and v, the errors are equal and equal to 'p'. Then the relative error in f is

A. $\frac{p}{2}\left(\frac{1}{u} + \frac{1}{v}\right)$

B. $p\left(\frac{1}{u} + \frac{1}{v}\right)$

C. $\frac{p}{2}\left(\frac{1}{u} - \frac{1}{v}\right)$

D. $p\left(\frac{1}{u} - \frac{1}{v}\right)$

Answer: B

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EXERCISE 1B (TANGENT AND NORMAL)

1. The gradient of the curve $y = x^3 - 3x^2 - 2x + 7$ at (1,3) is

A. 3

B. -4

C. -5

D. 7

Answer: C

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2. The slope of the tangent to the curve $y = 6 + x - x^2$ at (2,4) is

A. 10

B. $1/2$

C. -3

D. $1/\sqrt{2}$

Answer: C

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3. The slope of the tangent to the curve $y = \sin x$ at $x = \pi/4$ is

A. 0

B. 1

C. -1

D. $1/\sqrt{2}$

Answer: D

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4. The slope of the tangent to the curve $x^2 + y^2 = 4$ at $(\sqrt{2}, \sqrt{2})$ is

A. 0

B. 1

C. -1

D. $1/\sqrt{2}$

Answer: C

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5. The slope of the tangent to the curve $x = at^3, y = at^4$ at t=1 is

A. $-1/2$

B. $-2/3$

C. $1/4$

D. $4/3$

Answer: D

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6. Slope of the normal to the curve $y = \cos 2x$ "at" $x = \pi/6$ is

A. $-1/2$

B. $1/\sqrt{3}$

C. $3/4$

D. $4/3$

Answer: B

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7. Slope of the normal curve $xy = 12$ at $(3, 4)$ is

A. $-1/2$

B. $1/\sqrt{3}$

C. $3/4$

D. $4/3$

Answer: C

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8. Slope of the normal to the curve $x^3 + y^3 = 6xy$ at $(3, 3)$ is

A. 0

B. 1

C. -1

D. $1/\sqrt{2}$

Answer: B

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9. The slope of the normal to the curve $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ at $\theta = \pi/2$ is

A. 0

B. 1

C. -1

D. $1/\sqrt{2}$

Answer: C

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10. Slope of the normal to the curve $x=a(t+\sin t), y=a(t-\sin t)$ is

A. $\frac{\cot^2 t}{2}$

B. $-\frac{\cot^2 t}{2}$

C. $\frac{\tan^2 t}{2}$

D. $-\frac{\tan^2 t}{2}$

Answer: B

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11. If normal of the curve is parallel to x axis then

A. $\frac{dy}{dx} = 0$

B. $\frac{dy}{dx} = 1$

C. $\frac{dx}{dy} = 0$

D. $\frac{dx}{dy} = 1$

Answer: C

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12. If the slope of the tangent to the curve $xy + ax = by$ at (1,1) is 2, then (a,b)=

A. $(0, 1)$

B. $(1, 2)$

C. $(-1, 2)$

D. $(1, -2)$

Answer: B

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13. The equation of the tangent to the curve $y = x^3 + 1$ at (1,2) is

A. $3x - y = 1$

B. $x - 3y + 1 = 0$

C. $3x + y = 1$

D. $x + 3y + 1 = 0$

Answer: A

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14. The equation of the tangent to the curve $6y = 7 - x^3$ at (1,1) is

A. $2x + y = 3$

B. $x + 2y = 3$

C. $x + y = 1$

D. $x + y + 2 = 0$

Answer: B

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15. The equation of the tangent to the curve $y(x+1)=4$ at the point $(2, 4/3)$ is

A. $4x+9y+20=0$

B. $4x+9y-20=0$

C. $9x+4y+20=0$

D. $9x-4y+20=0$

Answer: B

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16. The equation of the tangent to the curve $2x^2 - xy + 3y^2 = 18$ at $(3, 1)$ is

A. $11x + 3y - 36 = 0$

B. $11x - 3y + 36 = 0$

C. $3x + 11y - 2 = 0$

D. $3x - 11y + 2 = 0$

Answer: A

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17. The equation of the tangent to the curve $y = x^3 - 2x + 7$ at $(1, 6)$ is

A. $y = x + 5$

B. $x+y=7$

C. $2x+y=8$

D. $x+2y=13$

Answer: A

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18. The equation of the tangent to the curve $y=x^3-2x+7$ at (x_1, y_1) is

A. $\frac{xx_1}{a}+\frac{yy_1}{b}=1$

B. $\frac{xx_1}{a}-\frac{yy_1}{b}=1$

C. $\frac{xx_1}{a^2}+\frac{yy_1}{b^2}=1$

D. $\frac{xx_1}{a^2}-\frac{yy_1}{b^2}=1$

Answer: C

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19. The equation of the tangent to the curve $y = \frac{6x}{x^2 - 1}$ at $(2, 4)$ is

A. $10x + 3y - 32 = 0$

B. $10x - 3y + 32 = 0$

C. $3x + 10y - 34 = 0$

D. $3x - 10y + 34 = 0$

Answer: A

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20. The equation of the tangent to the curve $y = \frac{8}{4 + x^2}$ at $x = 2$ is

A. $2x + y + 3 = 0$

B. $x - 2y + 4 = 0$

C. $2x - y - 3 = 0$

D. $x + 2y - 4 = 0$

Answer: D

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21. Equation of the tangent line at $x = a$ to the curve $y = a \log \sec \frac{x}{a}$ is

A. $(y - a \log \sec a) \tan 1 = x - a$

B. $(x - a)\tan 1 = y - a \log \sec 1$

C. $(x - a)\cos 1 = (y - a \log \sec 1)\sin$

D. none

Answer: B

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22. Equation of the tengent line at $y = a/4$ to the curve $y(x^2 + a^2) = ax^2$ is

A. $8y = -3\sqrt{3x} + a$

B. $8y = 3\sqrt{3x} + a$

C. $8y = 3\sqrt{3x} - a$

D. none

Answer: C

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23. Equation of the tangent to the curve $y^2 = 4ax$ at $(at^2, 2at)$ is

A. $x + yt - at^2 = 0$

B. $xt - y = 2at + at^3$

C. $xt + y = 2at + at^3$

D. $x - yt + at^2 = 0$

Answer: D

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24. The equation of the tangent to the curve$y^2 = \frac{x^3}{2a - x}$ at (a, a) is

A. $y + 2x = a$

B. $2x - y = a$

C. $x + 2y = 3a$

D. $2y - x = 3a$

Answer: B

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25. The equation of the tangent to the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $(a\sec\theta, b\tan\theta)$ is

A. $\frac{ax}{\sec\theta} + \frac{by}{\tan\theta} = a^2 + b^2$

B. $\frac{ax}{\cos\theta} - \frac{by}{\sin\theta} = a^2 - b^2$

C. $\frac{x}{y}\cos\theta + \frac{y}{b}\sin\theta = 1$

D. $\frac{x}{y}\tan\theta - \frac{y}{b}\sec\theta = 1$

Answer: D

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26. The equation of the tangent to the curve $\left(\frac{x}{a}\right)^4 + \left(\frac{y}{b}\right)^4 = 2$ at (a, b) is

A. $\frac{x}{a} + \frac{y}{b} = 2$

B. $\frac{x}{a} - \frac{y}{b} = 2$

C. $ax + by = a^2 + b^2$

D. $ax - by = a^2 - b^2$

Answer: A

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27. The tengent line at $\left(\frac{a}{\sqrt{8}}, \frac{a}{\sqrt{8}}\right)$ to the curve $x^{2/3} + y^{2/3} = a^{2/3}$ is parallel to the line

A. $x = -y$

B. $x = y$

C. $x = 0$

D. $y = 0$

Answer: A

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28. The equation of the tangent to the curve $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$ at $\left(a\cos^3\theta, b\sin^3\theta\right)$ is

A. $ax\cos\theta + by\sin\theta = a^2\cos^4 + b^2\sin^4\theta$

B. $ax\cos\theta - by\sin\theta = a^2\cos^4 - b^2\sin^4\theta$

C. $\dfrac{x}{a\cos\theta} + \dfrac{y}{b\sin\theta} = 1$

D. $\dfrac{x}{a\cos\theta} - \dfrac{y}{b\sin\theta} = 1$

Answer: C

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29. The equation of the normal to the curve $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ at $(\theta = \pi/2)$ is

A. $2x - 2y + 4a - \pi a = 0$

B. $2x - 2y - \pi a = 0$

C. $2x + 2y + \pi a = 0$

D. $2x + 2a - 4a - \pi a = 0$

Answer: A

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30. Equation of the tangent at $\theta = \pi/4$ to the curve $x = a\cos 2\theta, y = 2\sqrt{2}a\sin\theta$ is

A. $x + y = a$

B. $x + y = 2a$

C. $y = x + 2a$

D. none

Answer: B

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31. The equation of the tangent to the curve $\sqrt{x} + \sqrt{y} = 5$ at (9,4) is

A. $2x - 3y + 30 = 0$

B. $3x - 2y - 19 = 0$

C. $2x + 3y - 30 = 0$

D. $3x + 2y + 19 = 0$

Answer: C

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32. The equation of the normal to the curve $y = 3x^2 + 4x - 6$ at(1,1)` is

A. $x + 10y - 11 = 0$

B. $x - 10y + 12 = 0$

C. $x + y - 9 = 0$

D. none

Answer: A

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33. The equation of the normal to the curve $y = x + \frac{1}{x}$ at $(1, 2)$ is

A. $x = 1$

B. $x = 2$

C. $x = 3$

D. $x = 4$

Answer: A

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34. The equation of the normal to the curve $2y = 3 - x^2$ at $(1, 1)$ is

A. $x + y = 0$

B. $x - y = 0$

C. $x + y = 2$

D. $x - y = 2$

Answer: B

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35. The equation of the normal to the curve $x^2 = 4y$ at $(2, 1)$ is

A. $x + y + 3 = 0$

B. $x + y - 3 = 0$

C. $x - y + 3 = 0$

D. $x - y - 3 = 0$

Answer: B

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36. The equation of the normal to the curve $y^2 = x^3$ at $x = 8$ is

A. $x \pm 3\sqrt{2}y = 104$

B. $x \pm 2\sqrt{3}y = 104$

C. $x \pm 5\sqrt{2}y = 104$

D. $x \pm 2\sqrt{5}y = 104$

Answer: A

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37. The equation of the normal to the curve $y^4 = ax^3$ at (a, a) is

A. $x + 2y = 3a$

B. $3x - 4y + a = 0$

C. $4x + 3y = 7a$

D. $4x - 3y = 0$

Answer: C

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38. The equation of the normal to he curve $3y^2 = 4x + 1$ at (1.2) is

A. $3x + y + 5 = 0$

B. $3x + y - 5 = 0$

C. $3x - y + 5 = 0$

D. $3x - y - 5 = 0$

Answer: B

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39. the equation of the normal to the curve $y = \frac{6x}{x^2 - 1}$ at $(2, 4)$ is

A. $10x + 3y - 32 = 0$

B. $10x - 3y + 32 = 0$

C. $3x + 10y - 34 = 0$

D. $3x - 10y + 34 = 0$

Answer: D

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40. The equation of the normal to the curve $y = \frac{8}{4 + x^2}$ at $x = 2$ is

A. $2x + y + 3 = 0$

B. $x - 2y + 4 = 0$

C. $2x - y - 3 = 0$

D. $x + 2y - 4 = 0$

Answer: C

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41. The equation of the normal to the curve $y^2 = 4ax$ at $(at^2, 2at)$ is

A. $x + yt - at^2 = 0$

B. $xt - y = 2at + at^3$

C. $xt + y = 2at + at^3$

D. $x - yt + at^2 = 0$

Answer: C

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42. The equation of the normal to the curve $2x^2 - xy + 3y^2 = 18$ at $(3, 1)$ is

A. $11x + 3y - 36 = 0$

B. $11x - 3y + 36 = 0$

C. $3x + 11y - 2 = 0$

D. $3x - 11y + 2 = 0$

Answer: D

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43. The equation of the normal to the curve $y^2 = \frac{x^3}{2a - x}$ at (a, a) is

A. $y + 2x = a$

B. $2x - y = a$

C. $x + 2y = 3a$

D. $2y - x = 3a$

Answer: C

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44. The equation of the normal to the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $(a\cos\theta, b\sin\theta)$ is

A. $\frac{ax}{\sec\theta} + \frac{by}{\tan\theta} = a^2 + b^2$

B. $\frac{ax}{\cos\theta} - \frac{by}{\sin\theta} = a^2 - b^2$

C. $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$

D. $\frac{x}{a}\sec\theta - \frac{y}{b}\tan\theta = 1$

Answer: B

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45. The equation of the normal to the curve $\left(\frac{x}{a}\right)^4 + \left(\frac{y}{b}\right)^4 = 2$ at (a, b) is

A. $\frac{x}{a} + \frac{y}{b} = 2$

B. $\frac{x}{a}-\frac{y}{b}=2$

C. $ax+by=a^2+b^2$

D. $ax-by=a^2-b^2$

Answer: D

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46. The equation of the normal to the curve $\left(\frac{x}{a}\right)^{2/3}+\left(\frac{y}{b}\right)^{2/3}=1$ at $\left(a\cos^3\theta, b\sin^3\theta\right)$ is

A. $ax\cos\theta+by\sin\theta=a^2\cos^4+b^2\sin^4\theta$

B. $ax\cos\theta-by\sin\theta=a^2\cos^4-b^2\sin^4\theta$

C. $\frac{x}{a\cos\theta}+\frac{y}{b\sin\theta}=1$

D. $\frac{x}{a\cos\theta}-\frac{y}{b\sin\theta}=1$

Answer: B

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47. The equation of the normal to the curve $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ at $(\theta = \pi/2)$ is

A. $2x - 2y + 4a - \pi a = 0$

B. $2x + 2y - \pi a = 0$

C. $2x + 2y + \pi a = 0$

D. $2x + 2y - 4a - \pi a = 0$

Answer: B

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48. The normal to the curve $x = a(1 + \cos\theta)$, $y = a\sin\theta$ at $'\theta'$ always passes through the fixed point

A. $(a, 0)$

B. (a, a)

C. $(0, 0)$

D. $(0. a)$

Answer: A

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49. The normal to he curve $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$ at any point $'\theta'$ is such that

A. it passes through the origin

B. it makes angle $\pi/2+\theta$ with the x-axis

C. it passes through $(a\pi/2, -a)$

D. it is at a constant distance from the origin

Answer: D

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50. If the equation of the tangent at (2,3) on the curve $y=ax^2+b$ is $y=4x-5$ then $a=$

A. 0

B. 1

C. -1

D. 2

Answer: B

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51. If $y = 4x - 5$ is a tangent to the curve $y^2 = px^3 + q$ at $(2, 3)$, then

A. $p = 2, q = -7$

B. $p = -2, q = 7$

C. $p = -2, q = -7$

D. $p = 2, q = 7$

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52. The angle made by the tangent at any point of the curve $x = a(t + \sin t \cos t), y = a(1 + \sin t)^2$ with x-axis is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{\pi + t}{2}$

D. $\frac{\pi + 2t}{4}$

Answer: D

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53. The angle which the tangent at (2,1) to the curve $x^3 + y^3 = 9$ with the x-axis is

A. $\tan^{-1} 4$

B. $\tan^{-1} 2$

C. $\pi/2$

D. $\pi/4$

Answer: A

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54. If the tangent to the curve $xy + ax + by = 0$ at (1,1) is inclined at an angle $\tan^{-1} 2$ with x-axis, then

A. $a = 1, b = 2$

B. $a = 1, b = -2$

C. $a = -1, b = 2$

D. $a = -1, b = -2$

Answer: B

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55. If the line ax + by + c = 0 is a normal to the curve xy = 1 then

A. $a > 0, b > 0$

B. $a > 0, b < 0$

C. $a < 0, b < 0$

D. none

Answer: B

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56. The coordinates of the point P on the curve $x=a(\theta+\sin\theta), y=a(1-\cos\theta)$ where the tangent is inclined at angle $\frac{\pi}{4}$ to the x-axis, are

A. $\left(a\left(\frac{\pi}{2}-1\right), a\right)$

B. $\left(a\left(\frac{\pi}{2}+1\right), a\right)$

C. $\left(a\frac{\pi}{2}, a\right)$

D. (a, a)

Answer: B

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57. Points at which the tangents to the hyperbola $y=\frac{x-1}{x+1}$ are parllel to the line $y=2x+1$ are

A. $(0, 1), (2, -3)$

B. $(0, -1), (-2, 3)$

C. $(0, 2), (3, -5)$

D. none

Answer: A

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58. The point on the curve $y = x^2 + 5$, the tangent at which is perpendicular to the line $x + 2y = 2$ is

A. $(1, 6)$

B. $(1, -6)$

C. $(-1, 6)$

D. $(-1, -6)$

Answer: A

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59. The curve $y - e^{xy} + x = 0$ has a vertical tangent at the point

A. $(1, 1)$

B. at no point

C. $(0, 1)$

D. $(1, 0)$

Answer: A

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60. The point on the curve $y = x^3 + x - 2$, the tangent at which is parallel to the line $y = 4x - 1$ is

A. $(1, 0), (-1, -4)$

B. $(0, -1), (-2, 3)$

C. $(2, 13), (-2, -3)$

D. $(1, 2), (1, -2)$

Answer: A

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61. The line $x/a + y/b = 1$ is a tangent to curve $y = be^{-x/a}$ at the point

A. $(0, 0)$

B. $(0, a)$

C. $(0, b)$

D. $(b, 0)$

Answer: A

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62. The points on the curve $y = x^3$, the tangent at which are inclined at an angle of 60° to x-axis are

A. $\left(3^{-1/4}, 3^{-3/4}\right), \left(-3^{-1/4}, -3^{-3/4}\right)$

B. $\left(3^{-1/2}, 3^{-2/5}\right), \left(-3^{1/3}, -3^{-2/3}\right)$

C. $\left(2^{1/4}, 2^{-2/5}\right), \left(-3^{1/2}, -3^{-1/2}\right)$

D. none

Answer: D

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63. The point on the curve $x^2 + y^2 - 2x - 3 = 0$ at which the tangent is parallel to x-axis is

A. $(1, 0), (-1, -4)$

B. $(0, -1), (-2, 3)$

C. $(2, 13), (-2, -3)$

D. $(1, 2), (1, -2)$

Answer: D

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64. The point on the curve $x^4 - 4x^3 + 4x^2 + 1$ at which the tangent is parallel to x-axis is

A. $(0, 1), (1, 2), (2, 1)$

B. $(0 - 1), (-1, 2), (2, 1)$

C. $(0, 1), (1, -2), (2, -1)$

D. $(0, -1), (-1, 2), (-2, 1)$

Answer: A

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65. The points on the curve $y = x^2 + \sqrt{1 - x^2}$ at which the tangent is perpendicular to x-axis are

A. $(1, 1)$ only

B. $(\pm 1, 1)$

C. $(1, \pm 1)$

D. $(-1, 1)$ only

Answer: B

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66. The points on the curve $2a^2y = -x^3 - 3ax^2$ at which the tangent is perpendicular to y-axis is

A. $(0, 0), (2a, 2a)$

B. $(0, 0), (-2a, 2a)$

C. $(0, 0), (2a, -2a)$

D. $(0, 0), (-2a, -2a)$

Answer: D

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67. The equation of the tangent to the curve $4x^2 + 9y^2 = 40$ and having slope $-2/9$ is

A. $9x - 8y \pm 26 = 0$

B. $2x + 9y \pm 20 = 0$

C. $2x + 3y \pm 26 = 0$

D. $3x + y + 6 = 0$

Answer: B

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68. The equation of the tangent to the curve $9x^2 + 16y^2 = 52$ and which is parallel to the line $9x - 8y = 1$ is

A. $9x - 8y \pm 26 = 0$

B. $2x + 9y \pm 20 = 0$

C. $2x + 3y \pm 26 = 0$

D. $3x + y + 6 = 0$

Answer: C

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69. The equation of the tangent to the curve $x^2 + y^2 = 52$ and which is parallel to $2x + 3y = 6$ is

A. $9x - 8y \pm 26 = 0$

B. $2x + 9y \pm 20 = 0$

C. $2x + 3y \pm 26 = 0$

D. $3x + y + 6 = 0$

Answer: C

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70. The equation of the tangent to the curve $y = x + \frac{4}{x^2}$, that is parallel to the x-axis, is

A. $y = 0$

B. $y = 1$

C. $y = 2$

D. $y = 3$

Answer: D

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71. The equation of the tangent to the curve $y = x^3 + 3x^2 - 5$ and which is perpendicular to $2x - 6y + 1 = 0$ is

A. $9x - 8y \pm 26 = 0$

B. $2x + 9y \pm 20 = 0$

C. $2x + 3y \pm 26 = 0$

D. $3x + y + 6 = 0$

Answer: D

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72. The equation of the tangent to the curve $y^2 = 4x + 5$ and which is parallel to $y = 2x + 7$ is

A. $y = x + 2$

B. $x = y + 3$

C. $2x = y + 3$

D. $y = 2x + 3$

Answer: D

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73. The equation of the tangent to the curve $x^2 + 2y = 8$ and which is perpendicular to $x - 2y + 1 = 0$ is

A. $2x + y + 6 = 0$

B. $2x + y - 6 = 0$

C. $2x - y + 6 = 0$

D. $2x - y - 6 = 0$

Answer: B

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74. The points of contact of the tangents drawn from origin to the curve $3y = 3 + x^2$ is

A. $(3, 2)$

B. $(3, \sqrt{2})$

C. $(\pm\sqrt{3}, 2)$

D. $(3, \pm\sqrt{2})$

Answer: C

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75. The point of contact of the tangents drawn from origin to the curve $y = x^2 + 3x + 4$ is

A. $(2, 14), (2, 2)$

B. $(-2, 14), (2, 2)$

C. $(2, 14), (-2, 2)$

D. $(2, -14), (-2, 2)$

Answer: C

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76. The equation of the tangent to the curve $y(x-2)(x-3)-x+7=0$ where the curve cuts x-axis is

A. $20x+y-140=0$

B. $x-20y-7=0$

C. $20x-y+140=0$

D. $x+20y+7=0$

Answer: B

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77. The equation of the tangent to the curve $y = be^{-x/a}$ where it crosses the y-axis is

A. $ax + by = 1$

B. $\frac{x}{a} + \frac{y}{b} = 1$

C. $\frac{x}{b} + \frac{y}{a} = 1$

D. $ax - by = 1$

Answer: B

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78. Equation of the tangent to the curve $y = 2x^3 - 6x^2 - 9$ at the point where the curve crosses the y -axis is

A. $y + 9 = 0$

B. $y - 9 = 0$

C. $2y + 1 = 0$

D. $2y - 1 = 0$

Answer: A

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79. The equation of the tangent to the curve $y = \dfrac{x+9}{x+5}$ so that is passes through the origin is

A. $x + y = 0$

B. $x - y = 0$

C. $x + y = 1$

D. $x - y = 1$

Answer: A

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80. The equation of the normal to the curve $y = be^{-x/a}$ where it cuts y-axis is

A. $\frac{x}{a} + \frac{y}{b} = 1$

B. $\frac{x}{a} - \frac{y}{b} = 1$

C. $ax + by - b^2 = 0$

D. $ax - by + b^2 = 0$

Answer: D

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81. The equation of the normal to the curve $y = 2x^3 + 6x^2 - 9$ where the curve crosses the y-axis is

A. $x = 0$

B. $x = 1$

C. $x = 2$

D. $x = 3$

Answer: A

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82. The distance between the origin and the normal to the curve $y = e^{2x} + x^2$ at $x = 0$ is

A. 2

B. $\sqrt{5}$

C. $2\sqrt{5}$

D. $2 / \sqrt{5}$

Answer: D

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83. The normal to he curve $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$ at any point $'\theta'$ is such that

A. it makes constant angle with positive x-axis

B. it passes through (0. 0)

C. it is at a constant distance from (0, 0)

D. none

Answer: C

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84. If the normal to the curve $x^3 - y^2 = 0$ at $\left(m^2, -m^3\right)$ is $y = mx - 2m^3$, then the value of m^2 is

A. $1/3$

B. $1/6$

C. $2/3$

D. $2/3$

Answer: C

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85. The portion of the tangent drawn at any point on $x^{2/3} + y^{2/3} = a^{2/3}(a > 0)$, except the points points on the coordinate axes, included between the the coordinates axes is

A. a

B. $2a$

C. $a^{2/3}$

D. a^2

Answer: A

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86. The tangent at $\theta = \pi / 4$ to the curve $x = a\cos^3\theta, y = a\sin^3\theta$ meets the x and y axis in A and B, then the length of AB is

A. a

B. $2a$

C. a^2

D. $a / 2$

Answer: A

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87. Tangent at any point of the curve $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$ makes intercepts x_1 and y_1 on the axes. Then

A. $\left(\frac{x_1}{a}\right)^{2/3} + \left(\frac{y_1}{b}\right)^{2/3} = 1$

B. $\frac{x_1^2}{a^2} + \frac{y_1^2}{b^2} = 1$

C. $\frac{x_1^3}{a^3} + \frac{y_1^3}{b^3} = 1$

D. none

Answer: B

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88. The sum of the intercepts on the coordinate axes of any tangent to $\sqrt{x} + \sqrt{y} = \sqrt{a}$ is

A. a

B. $3a$

C. $5a$

D. $9a$

Answer: A

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89. IF the tangent at any point P on the curve $x^m y^n = a^{m+n}$, $mn \neq 0$ meets the coordinate axes in A.B then show that $AP : BP$ is a constant.

A. $m : n$

B. $n : m$

C. $-m : n$

D. $-n : m$

Answer: B

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90. The tangent at any point f the curve $x = at^3, y = at^4$ divides the abscissa of the point of contact in the ratio

A. $2 : 3$

B. $3 : 2$

C. $1 : 3$

D. $3 : 1$

Answer: C

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91. If pand qare the lengths of the perpendiculars from the origin on the tangent and the normal to the curve $x^{2/3}+y^{2/3}=a^{2/3}$, then $4p^2+q^2$=

A. a

B. a^2

C. $2a^2$

D. $5a^2$

Answer: B

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92. If the tangent at any point on the curve $x^4+y^4=a^4$ cuts off intercepts p and q on the coordinate axes, then

$p^{-4/3} + q^{-4/3} =$

A. $a^{-4/3}$

B. $a^{-1/2}$

C. $a^{1/2}$

D. a

Answer: A

Watch Video Solution

93. The sum of the squares o the intercepts on the coordinates axes of any tangent to $x^{2/3} + y^{2/3} = a^{2/3}$ is

A. a^2

B. a$a^2/2$

C. $2a^2$

D. $3a^2$

Answer: A

Watch Video Solution

94. If the tangent at any point on the curve $x^{1/3} + y^{1/3} = a^{1/3} (a > 0)$ cuts of intercepts p and q on the coordinate axes then $\sqrt{p} + \sqrt{q}$ =

A. $\sqrt{a}$

B. $\sqrt[3]{a}$

C. $2\sqrt{a}$

D. $2\sqrt[3]{a}$

Answer: A

Watch Video Solution

95. If the sum of the squares of the intercepts on the axes cut off by the tangent to the curve $x^{1/3} + y^{1/3} = a^{1/3} \text{with} (a > 0)$ at $(a/8, a/8)$ is 2, then a has the value

A. 1

B. 2

C. 4

D. 8

Answer: C

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96. If the tangent at the point (at^2, at^3) on the curve $ay^2 = x^3$ meets the curve again at Q, then q=

A. $\left(\frac{at^2}{4}, \frac{-at^3}{8}\right)$

B. $\left(\frac{at}{4}, 8at\right)$

C. $\left(\frac{at}{2}, 2at^2\right)$

D. $\left(\frac{at}{2}, at^2\right)$

Answer: A

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97. If the tangent at $(1, 1)$ on $y^2 = x(2-x)^2$ meets the curve again atpis

A. $(4, 4)$

B. $(-1, 2)$

C. $(9/4, 3/8)$

D. none

Answer: C

Watch Video Solution

98. If the tengent at pto the curve $xy = c^2$ meets the axes at A, B and pdivides AB in the ratio

A. $1:2$

B. $1:1$

C. $2:5$

D. $3:5$

Answer: B

Watch Video Solution

99. The area of the triangle formed by the tangent to the curve $xy = a^2$ at point on the curve, with the coordinate axes is

A. a^2

B. $2a^2$

C. $4a^2$

D. $8a^2$

Answer: B

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100. The area of the triangle formed by the tangent to the curve $y = 8/(4 + x^2)$ at $x = 2$ and the co-ordinates axes is

A. 2 sq.units

B. 4 sq.units

C. 8 sq.units

D. $7/2$ sq.units

Answer: B

Watch Video Solution

101. If δ is the area of the triangle formed by the positive x axis and the normal and tangent to the circle $x^2 + y^2 = 4$ at $(1, \sqrt{3})$, thenδ =

A. $\frac{\sqrt{3}}{2}$

B. $\sqrt{3}$

C. $2\sqrt{3}$

D. 6

Answer: C

Watch Video Solution

102. If the tangent at $\theta = \pi / 4$ to the curve $x = a\cos^3\theta, y = a\sin^3\theta$ meets the x and y axis in A and B, then the area of δAOB is

A. a^2

B. $a^2/2$

C. $a^2/4$

D. $a^2/8$

Answer: C

Watch Video Solution

103. If the area of the triangle, included between the axes and any tangent to the curve $xy^n = a^{n+1}$ is constant, then the vlue of n is

A. -1

B. -2

C. 1

D. 2

Answer: C

Watch Video Solution

104. The area of the triangle formed by the normal to the curve $x = e^{\sin y}$ at $(1, 0)$ with the coordinate axes is

A. $1/4$

B. $1/2$

C. $3/4$

D. 1

Answer: B

Watch Video Solution

105. The area of the triangle formed by the tangent and the normal at the points (a, a) on the curve $y^2 = \frac{x^3}{2a - x}$ and the line $x = 2a$ is

A. $a^2/4$

B. $a^2/2$

C. $5a^2/4$

D. $9a^2/4$

Answer: C

Watch Video Solution

106. Area of the triangle formed by the tangent, normal to the curve $x^2/a^2 + y^2/b^2 = 1$ at the point $\left(a/\sqrt{2}, b/\sqrt{2}\right)$ and the x axis is

A. $\frac{ab}{4}\sqrt{a^2 + b^2}$

B. $4ab$

C. $\frac{b}{4a}\left(a^2 + b^2\right)$

D. none

Answer: C

Watch Video Solution

107. Area of the triangle formed by the tangent, normal at (1, 1) on the curve $\sqrt{x} + \sqrt{y} = 2$ and the x axis is

A. 1 sq.units

B. 2 sq.units$1/2$ sq.units

C. $1/2$ sq.units

D. 4 sq.units

Answer: A

Watch Video Solution

108. Area of the triangle formed by the tangent, normal at (a, a) on $y(2a - x) = x^2$ and the x axis is

A. $a^2/3$

B. $5a^2$

C. $5a^2/3$

D. none

Answer: C

Watch Video Solution

109. The point on the intersection of the tangents drawn to the curve $x^2y = 1 - y$ at the points where it is intersected by the curve $x^2y = 1 - y$ at the points where it I intersected by the curve $xy = 1 - y$ is

A. (0, 1)

B. $(1, 1/2)$

C. (0, -1)

D. $(1/2, 1)$

Answer: A

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110. The two curves $y = x^2 + 1, y = 3x^2 - 4x + 3$ at $(1, 2)$

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: A

Watch Video Solution

111. The two curves $y = x^{-3}$, $y = e^{3(1-x)}$ at (1,1)

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: A

Watch Video Solution

112. The two curves $y^2 = 4(x+1)$, $y^2 = 36(9-x)$ at (8, 6)

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: B

Watch Video Solution

113. The two curves $y = \frac{x+3}{x^2+1}, y = \frac{x^2-7x+11}{x-1}$ at (2, 1)

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: C

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114. The two curves $2x^2 + y^2 = 20, x^2 - 4y^2 + 8 = 0$

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: B

Watch Video Solution

115. The two curves $x^2 + y^2 = 25, 2x^2 - 9y + 18 = 0$

A. touch each other

B. cut orthoganally

C. cut at an angle of 45°

D. none

Answer: B

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116. The curves $y = x^3 - 3x^2 - 8x - 4, y = 3x^2 + 7x + 4$ touch at the point (-1, 0). The equation of the common tangent is

A. $x + y + 1 = 0$

B. $x + y - 1 = 0$

C. $x - y + 1 = 0$

D. $x - y - 1 = 0$

Answer: C

Watch Video Solution

117. The curves $y = x^2 - 1, y = 8x - x^2 - 9$ touch each other at the point (2, 3). The equation of the common normal is

A. $4x + y + 5 = 0$

B. $4x - y - 5 = 0$

C. $x + 4y - 14 = 0$

D. $x - 4y + 14 = 0$

Answer: C

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118. The angle between the curves $y^2 = 4x$ and $x^2 = 2y - 3$ at the point (1, 2) is

A. 30°

B. 60°

C. 90°

D. 0°

Answer: D

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119. The angle between the curves $y^2 = 8x$, $x^2 = 4y - 12$ at (2, 4) is

A. $\pi / 2$

B. $\pi / 4$

C. $\pi / 6$

D. 0

Answer: D

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120. The angle between the curves $xy = 4$ and $x^2 - y^2 = 15$ at the point (-4, -1) is

A. 60°

B. 90°

C. $\tan^{-1}(1/2)$

D. $\tan^{-1}(5/2)$

Answer: B

Watch Video Solution

121. The angle between the curves $y^2 = 4x + 4$ and $y^2 = 36(9 - x)$ is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

Watch Video Solution

122. The angle between curves $y^2 = 4ax, ay = 2x^2$ is

A. $\tan^{-1}\left(\frac{3}{4}\right)$

B. $\tan^{-1}\left(\frac{3}{5}\right)$

C. $\tan^{-1}\left(\frac{4}{3}\right)$

D. $\tan^{-1}\left(\frac{5}{3}\right)$

Answer: B

Watch Video Solution

123. The angle between the curves $y^2 = x, x^2 = y$ at (1, 1) is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\tan^{-1}\frac{3}{4}$

D. $\tan^{-1}\frac{4}{3}$

Answer: C

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124. The curves $y = 3x^2, y^2 = 2x$ intersect at origin

A. orthogonally

B. at an angle of $\pi/4$

C. at an angle of$\pi/3$

D. at anangle of$\pi/6$

Answer: A

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125. The angle between the curves $y^2 = 4x, x^2 = 4y$ at (0, 0) is

A. $\pi/2$

B. $\pi/3$

C. $\pi/6$

D. 0

Answer: a

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126. The curves $y = x^3, 6y = 7 - x^2$ intersect at (1, 1) at an angle of

A. $\pi / 2$

B. $\pi / 4$

C. $\pi / 3$

D. none

Answer: A

Watch Video Solution

127. The angle between the curves $y = x, y = 1 / x$ at (1, 1) is

A. $\pi/2$

B. $\pi/3$

C. $\pi/6$

D. 0

Answer: A

128. The angle between the curves $x^2 = 2y$, $x^2 + y^2 = 8$ at (2, 2) is

A. $\tan^{-1}\left(\frac{1}{3}\right)$

B. $\tan^{-1}(3)$

C. $\tan^{-1}\left(\frac{1}{2}\right)$

D. $\tan^{-1}\left(\frac{2}{3}\right)$

Answer: B

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129. The angle between the curves $x^2 = 4y, x^2 + y^2 = 5$ at (-2, 1) is

A. 30°

B. 60°

C. $\tan^{-1} 3$

D. none

Answer: B

Watch Video Solution

130. The angle between the curves $x^2 = 4y, y^2 = 4x$ at (4, 4)

is

A. $\tan^{-1}\left(\frac{1}{2}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right)$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: B

Watch Video Solution

131. The angle between the curves $x^2 = 4y, x^2 + y^2 = 5$ at (-2,

1) is

A. 3

B. $3/4$

C. $3/5$

D. $5/14$

Answer: A

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132. If θ is the angle between the curves $y^2 = 4ax, ay = 2x^2$ at $(a, 2a)$, then $\tan\theta$ =

A. 3

B. $3/4$

C. $3/5$

D. $5/14$

Answer: C

Watch Video Solution

133. If θ is the angle between the curves $xy=2, y^2=4x$ at (1, 2), then $\tan\theta$=

A. 3

B. $3/4$

C. $3/5$

D. $5/14$

Answer: A

Watch Video Solution

134. Find the angle between the curves xy=2 and $x^2 + 4y = 0$

A. 1

B. -1

C. 2

D. 3

Answer: D

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135. The angle between the curves $y = \sin x$ and $y = \cos x$ is

A. 2

B. $\sqrt{2}$

C. $1\sqrt{2}$

D. $2\sqrt{2}$

Answer: D

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136. The angle between the curves $y = \sin x$ and $y = \cos x$ is

A. $\tan^{-1}(2\sqrt{2})$

B. $\tan^{-1}(3\sqrt{2})$

C. $\tan^{-1}(3\sqrt{3})$

D. $\tan^{-1}(5\sqrt{2})$

Answer: A

Watch Video Solution

137. If θ is the angle of interaction of the curves $y^2 = x^3$ and $y = 2x^2 - 1$ at (1, 1), then $|\tan\theta|$ =

A. $5/14$

B. $5/12$

C. $25/12$

D. none

Answer: A

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138. The angle between the curves $xy = 2$ and $y^2 = 4x$ is

A. $\tan^{-1}\left(\frac{1}{3}\right)$

B. $\tan^{-1}3$

C. $\tan^{-1}\left(\frac{1}{2}\right)$

D. $\tan^{-1}\left(\frac{2}{3}\right)$

Answer: B

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139. The angle between the curves $x^2 + y^2 = 4$ and $x^2 = 3y$ is

A. $\tan^{-1}\left(\frac{6}{13}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right)$

C. $\tan^{-1}\left(\frac{5}{\sqrt{3}}\right)$

D. $\tan^{-1}\left(4\frac{\sqrt{2}}{7}\right)$

Answer: C

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140. The angle between the curves $y^2 = 4x$ and $x^2 = 4y$ is

A. $\tan^{-1}\left(\frac{6}{13}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right), \frac{\pi}{2}$

C. $\tan^{-1}\left(\frac{5}{\sqrt{3}}\right)$

D. $\tan^{-1}\left(4\frac{\sqrt{2}}{7}\right)$

Answer: B

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141. The angle between the curves $y = x^2$ and $y = 4 - x^2$ is

A. $\tan^{-1}\left(\frac{6}{13}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right)$

C. $\tan^{-1}\left(\frac{5}{\sqrt{3}}\right)$

D. $\tan^{-1}\left(4\frac{\sqrt{2}}{7}\right)$

Answer: D

Watch Video Solution

142. The angle between the curves $y^2 = 8x$, $x^2 = 4y - 12$ at (2, 4) is

A. $\pi / 2$

B. $\pi/4$

C. $\pi/6$

D. 0

Answer: D

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143. The condition that the two curves $x = y^2, xy = k$ cut orthogonally is

A. $2k^2 = 1$

B. $8k^2 = 1$

C. $8k^3 = 1$

D. $2k^3 = 1$

Answer: B

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144. The two curves $x = y^2, xy = a^3$ cut arthogonally at a point, then a^2=

A. $1/3$

B. $1/2$

C. 2

D. 3

Answer: B

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145. The condition that the two curves $y^2 = 4ax$, $xy = c^2$ cut orthogonally is

A. $c^2 = 16a^2$

B. $c^2 = 32a^2$

C. $c^4 = 16a^4$

D. $c^4 = 32a^4$

Answer: D

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146. The curves $ax^2 + by^2 = 1$ and $Ax^2 + By^2 = 1$ intersect orthogonally, then

A. $\frac{1}{a} + \frac{1}{A} = \frac{1}{b} + \frac{1}{B}$

B. $\frac{1}{a} - \frac{1}{A} = \frac{1}{b} - \frac{1}{B}$

C. $\frac{1}{a} + \frac{1}{A} = \frac{1}{b} - \frac{1}{B}$

D. none

Answer: B

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147. If the curves $x^2 + py^2 = 1$ and $qx^2 + y^2 = 1$ are orthogonal to eeach other, then

A. $p - q = 2$

B. $\frac{1}{p} - \frac{1}{q} = 2$

C. $\frac{1}{p} + \frac{1}{q} = -2$

D. $\frac{1}{p} + \frac{1}{q} = 2$

Answer: D

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148. If the curves $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $\frac{x^2}{25}+\frac{y^2}{16}=1$ cut each other orthagonally, then a^2-b^2=

A. 400

B. 75

C. 41

D. 9

Answer: D

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149. If the curves $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $\frac{x^2}{l^2}-\frac{y^2}{m^2}=1$ cut each other orthagonally, then

A. $a^2+b^2=l^2+m^2$

B. $a^2-b^2=l^2-m^2$

C. $a^2-b^2=l^2+m^2$

D. $a^2+b^2=l^2-m^2$

Answer: C

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150. The curves $\frac{x^2}{a^2+k_1}+\frac{y^2}{b^2+k_1}=1$ and $\frac{x^2}{a^2+k_2}+\frac{y^2}{b^2+k_2}=1$ where $k_1 \neq k_2$ intersect at an angle

A. 0

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: D

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151. If the curves $y^2 = 6x, 9x^2 + by^2 = 16$, cut each other at right angles then the value of b is

A. 2

B. 4

C. $9/2$

D. none

Answer: C

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152. Angle between then tangents to the curve $y = x^2 - 5x + 6$ at the points (2, 0) and (3, 0) is

A. $\pi / 6$

B. $\pi / 4$

C. $\pi / 3$

D. $\pi / 2$

Answer: D

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153. The length of the tangent of the curve $y = x^3 + 1$ at (1, 2)

is

A. $\sqrt{10}$

B. $2\sqrt{10}$

C. $2\sqrt{10}/3$

D. 6

Answer: C

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154. The length of the tangent of the curve $y^2 = \dfrac{x^3}{2a - x}$ at

(a, a) is

A. $\sqrt{5}|a|$

B. $2|a|$

C. $\sqrt{5}\frac{|a|}{2}$

D. $\frac{|a|}{2}$

Answer: C

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155. The length of the tangent of the curve $2x^2 + 3xy - 2y^2 = 8$ at (2, 3) is

A. $\frac{\sqrt{325}}{2}$

B. $3\frac{\sqrt{325}}{17}$

C. $\frac{17}{2}$

D. $\frac{18}{17}$

Answer: B

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156. The length of the tangent of the curve $x = a\cos^3\theta, y = a\sin^3\theta(a > 0)$ is

A. $a\sin^2\theta$

B. $a\sin^2\theta|\tan\theta|$

C. $a\sin^2\theta|\cos\theta|$

D. $a\sin^4|\sec\theta|$

Answer: A

Watch Video Solution

157. The length of the normal to the curve $y = x^2 + 1$ at (1, 2) is

A. $\sqrt{5}$

B. $2\sqrt{5}$

C. 1

D. 4

Answer: B

Watch Video Solution

158. The length of the normal to the curve $y = c\cos\left(\frac{hx}{c}\right)$ at any point is

A. y/c

B. y^2 / c

C. $2y / c$

D. $2y^2 / c$

Answer: B

Watch Video Solution

159. The length of the normal to the curve $y^2 = \frac{x^3}{2a - x}$ at (a, a) is

A. $\sqrt{5}|a|$

B. $2|a|$

C. $\sqrt{5}\frac{|a|}{2}$

D. $\frac{|a|}{2}$

Answer: A

Watch Video Solution

160. The length of the normal of the curve $2x^2 + 3xy - 2y^2 = 8$ at (2, 3) is

A. $\frac{\sqrt{325}}{2}$

B. $3\frac{\sqrt{325}}{17}$

C. $\frac{17}{2}$

D. $\frac{18}{17}$

Answer: A

Watch Video Solution

161. The length of the normal to the curves $x = a\cos^3\theta, y = a\sin^3\theta(a > 0)$ is

A. $a\sin^2\theta$

B. $a\sin^2\theta|\tan\theta|$

C. $a\sin^2\theta|\cos\theta|$

D. $a\sin^4|\sec\theta|$

Answer: B

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162. The length of the normal at pon the curve $x = a(t + \sin t), y = a(1 - \cos t)$ is

A. $a\sin t$

B. $2a\sin^3\frac{t}{2}\sec\frac{t}{2}$

C. $2a\sin\frac{t}{2}\tan\frac{t}{2}$

D. $2a\sin\frac{t}{2}$

Answer: C

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163. The length of the normal to the curve $y = a\left(\frac{e^{-x/a} + e^{x/a}}{2}\right)$ at any point varies as the

A. abscissa of the point

B. ordinate of the point

C. square of the avscissa of the point

D. square of the ordinate of the point

Answer: D

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164. The length of subtangent to $y = be^{x/a}$ at any point is

A. a

B. $2a$

C. a^2

D. $a/2$

Answer: A

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165. The length of the subtangent at any point (x_1, y_1) on the curve $y = 5^x$ is

A. 5^{x_1}

B. $y_1 \cdot 5^{x_1}$

C. $\log_e 5$

D. $\dfrac{1}{\log_e 5}$

Answer: D

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166. The length of subtangent to $\sqrt{x} + \sqrt{y} = 3$ at (4, 1) is

A. 2

B. $\sqrt{2}$

C. $1/\sqrt{2}$

D. $2\sqrt{2}$

Answer: A

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167. The length of subtangent to $x^2y^2 = a^4$ at (a, a) is

A. a

B. $2a$

C. a^2

D. $a/2$

Answer: A

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168. The length of subtangent to $x^2 + xy + y^2 = 7$ at (1, -3) is

A. 5

B. $1/5$

C. $3/5$

D. 15

Answer: D

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169. The length of subtangent to $y = x \sin x$ at $x = \pi/2$ is

A. $\pi/2$

B. $\pi/4$

C. $\pi/6$

D. 0

Answer: A

Watch Video Solution

170. The length of the subtangent to the curve $y^2 = \frac{x^2}{2a - x}$ at (a, a) is

A. $\sqrt{5}|a|$

B. $2|a|$

C. $\sqrt{5}\frac{|a|}{2}$

D. $\frac{|a|}{2}$

Answer: D

Watch Video Solution

171. The length of the subtangent of the curve $2x^2 + 3xy - 2y^2 = 8$ at (2, 3) is

A. $\frac{\sqrt{325}}{2}$

B. $3\frac{\sqrt{325}}{17}$

C. $\frac{17}{2}$

D. $\frac{18}{17}$

Answer: D

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172. The length of subtangent to $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ at θ is

A. $a|\sin\theta|$

B. $a|\cos\theta|$

C. $a|\tan\theta|$

D. $a|\cot\theta|$

Answer: A

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173. The length of the subtangent of the curve $x = a\cos^3\theta, y = a\sin^3\theta (a > 0)$ is

A. $a \sin^2 \theta$

B. $a \sin^2 \theta |\tan \theta|$

C. $a \sin^2 \theta |\cos \theta|$

D. $a \sin^4 |\sec \theta|$

Answer: C

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174. For the parabola $y^2 = 4ax$, the ratio of the subtangent to the abscissa is

A. $1 : 1$

B. $2 : 1$

C. $x : y$

D. $x^2 : y$

Answer: B

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175. The subtangent at $x = \pi/2$ on the cirve $y = x \sin x$ is

A. 1

B. $\pi/2$

C. 0

D. π

Answer: B

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176. The subtangent to the curve $x^m y^n = a^{m+n}$ at any point (x, y) is

A. $-\frac{mx}{y}$

B. $-\frac{ny}{m}$

C. $-\frac{mx}{n}$

D. $\frac{nx}{m}$

Answer: D

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177. The length of the subtangent (if exists) at any point θ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

A. $a|\sin\theta|\sec^2\theta$

B. $a\sin\theta|\sec\theta|$

C. $a|\sin\theta\cos\theta|$

D. $a\sin^2\theta|\sec\theta|$

Answer: D

Watch Video Solution

178. The length of the subtangent to the curve $x^2y^2 = a^4$ at any point $(-a, a)$ is

A. $3a$

B. $2a$

C. a

D. $4a$

Answer: C

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179. The length of the subtangent at (2, 2) to the cuvre $x^5 = 2y^4$ is

A. $5/2$

B. $8/5$

C. $2/5$

D. $5/8$

Answer: B

Watch Video Solution

180. The curve $y^2 = (x + a)^3$, the square of the subtangent is ..... Subnormal

A. equal to

B. varies as

C. double the

D. square of the

Answer: B

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181. The length of subnormal at $(-1, 4)$ on $y = 4x^2$ is

A. 4

B. 16

C. 32

D. 8

Answer: C

Watch Video Solution

182. The length of the subnormal to the curve $y^2 = x^3$ at (4, 8) is

A. 24

B. $8/3$

C. $3/8$

D. none

Answer: A

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183. The length of the subnomal to the curve $y^2 = 2px$ is

A. p

B. $2p$

C. $3p$

D. $4p$

Answer: A

Watch Video Solution

184. The length of the subnormal to the curve $x^2 = 4ay$ at $(4a, 4a)$ is

A. $2a$

B. $4a$

C. $6a$

D. $8a$

Answer: D

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185. The length of subnormal of the curve $2x^2 + 3xy - 2y^2 = 8$ at (2, 3) is

A. $\frac{\sqrt{325}}{2}$

B. $3\frac{\sqrt{325}}{17}$

C. $\frac{17}{2}$

D. $\frac{18}{17}$

Answer: C

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186. The length of subnormal to the curve $y = b\sin\frac{x}{a}$ at any point is

A. $a\tan\frac{x}{a}$

B. $\frac{b}{2a}\sin\frac{x}{a}$

C. $\frac{b}{2a}\sin\frac{2x}{a}$

D. $\frac{b^2}{2a}\sin\frac{2x}{a}$

Answer: D

Watch Video Solution

187. The length of the subnormal of the curves $x = a\cos^3 theat, y = a\sin^3\theta(a > 0)$ is

A. $a\sin^2\theta$

B. $a\sin^2\theta|\tan\theta|$

C. $a\sin^2\theta|\cos\theta|$

D. $a\sin^4|\sec\theta|$

Answer: D

Watch Video Solution

188. The length of subnormal of the curves $y = \frac{a}{2}\left(e^{x/a} + e^{-x/a}\right)$ at any point is

A. $a\cosh^2\frac{x}{a}$

B. $\frac{a}{2}\sinh\frac{2x}{a}$

C. $a\cosh\frac{x}{a}$

D. $a\sinh\frac{2x}{a}$

Answer: B

Watch Video Solution

189. The subnormal of the curve $y = a^x$ at any point on the varies directly as

A. cube of the ordinate $\left(y^3\right)$

B. square of the ordinate $\left(y^2\right)$

C. ordinate (y)

D. none

Answer: B

Watch Video Solution

190. The subnormal to the curve $xy = c^2$ at any point vaires directly as

A. cube of the ordinate $\left(y^3\right)$

B. square of the ordinate $\left(y^2\right)$

C. ordinate (y)

D. none

Answer: A

Watch Video Solution

191. The subtangent at any point of the curve $x^m y^n = a^{m+n}$ varies as its

A. abscissa of the point

B. ordinate of the point

C. square of abscissa

D. square of ordinate

Answer: A

Watch Video Solution

192. For the curve $y^2 = (x+a)^3$, the square of the subtangent is ..... Subnormal

A. equal to

B. varies as

C. double the

D. square of the

Answer: B

Watch Video Solution

193. The subtangent, ordinate and subnormal to the parabola $y^2 = 4ax$ at a point (different from the origin) are in

A. A.P.

B. G.P.

C. H.P.

D. none

Answer: B

Watch Video Solution

194. If the relation between subnormal SN and subtangent ST at any point on the curve $by^2 = (x+a)^3$ is $p(SN) = q(ST)^2$, thenp/q =

A. $8/27$

B. $27/8$

C. $8\frac{b}{27}$

D. $27b/8$

Answer: C

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195. If the subnormal of the curve $xy^n = a^{n+1}$ is constant, then the value of n is

A. 1

B. -1

C. 5

D. -2

Answer: D

Watch Video Solution

196. If the subnormal at any point $y = a^{1-n}x^n$ is of constant length, then then value of n is

A. 1

B. $1/2$

C. 2

D. -2

Answer: B

Watch Video Solution

197. If at any point on the curve $y = f(x)$, the length of the subnormal is constant, then the curve will be a

A. cirvle

B. ellipse

C. parabola

D. straight line

Answer: C

Watch Video Solution

198. The length of the subtangent to the curve $y = ae^{x/b}$ at any point is

A. constant

B. equal to subnormal

C. equal to the square of the subnormal

D. none

Answer: A

Watch Video Solution

199. the length of the subnormal to the curve $y^2 = 4ax$ at any point is

A. constant

B. equal to subnormal

C. equal to the square of the subnormal

D. none

Answer: A

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200. Length of the subtangent at any point on $y^n = a^{n-1}x$ is

A. proportinal to abscissa

B. proportional to ordinate

C. length of the subnormal

D. none

Answer: B

Watch Video Solution

201. Length of the subnormal at any point on $y^n = a^{n-1}x$ is constant when n =

A. 1

B. -1

C. -2

D. 2

Answer: D

Watch Video Solution

202. The length of the tangent to the curve $x = a\left(\cos t + \log \tan\frac{t}{2}\right), y = a \sin t$ at any point is

A. constant

B. equal to subnormal

C. equal to the square of the subnormal

D. none

Answer: A

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203. The sum of the lengths of the subtangent and subnormal at $\theta = \pi / 3$ on the cycloid $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ is

A. $2a$

B. $2\sqrt{a}$

C. $2a / \sqrt{3}$

D. $a / \sqrt{3}$

Answer: C

Watch Video Solution

204. If the length of the subtangent = 9 and the length of the subnormal = 4 at a point (x, y) on $y = f(x)$ then ordinate of the point =

A. 36

B. $9/4$

C. $4/9$

D. ± 6

Answer: D

Watch Video Solution

205. The sum of the lengths of tangent and subtangent ata point of $y = a\log(x^2 - a^2)$, $(a > 0)$ is proportional to

A. $|x|$

B. $|y|$

C. $|xy|$

D. $|x/y|$

Answer: C

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EXERCISE 1C (RATE OF CHANGE)

1. The distance $'s'$ described by a particle in t seconds is given by $s = ae^t + be^{-t}$. The velocity at any time t is

A. $ae^t + be^{-t}$

B. $ae^t - be^{-t}$

C. $-ae^{-t} - be^t$

D. $ae^{-t} + be^t$

Answer: B

Watch Video Solution

2. The distance described by a particle in t seconds is given by $s = ae^t + be^{-t}$. The acceleration is

A. $ae^t + be^{-t}$

B. $ae^{t} - be^{-t}$

C. $-ae^{-t} - be^{t}$

D. $ae^{-t} + be^{t}$

Answer: A

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3. If the distance s travelled by a particle in time t is given by $s = t^2 - 2t + 5$, then its acceleration is

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

4. The distance travelled by a particle in time t is gicen by $s = t^3 - 2t^2 - 3t + 5$. The velocity of the particle when $t = 2$ sec is

A. 1 uint/sec

B. 2 unit/sec

C. $1/2$ unit/sec

D. 3 unit/sec

Answer: A

Watch Video Solution

5. A particle is projected vertically upward. Its height $'h'$ at time $'t'$ has the relation $h = 60t - 16t^2$. The velocity at which it hits the ground is

A. 60

B. 30

C. 90

D. 180

Answer: A

Watch Video Solution

6. A stone projected vertically upward moves according to the law $s = 100t - 16t^2$. The acceleration at $t = 2$ sec is

A. $-32unit/\sec^2$

B. $32unit/\sec^2$

C. $16unit/\sec^2$

D. $8unit/\sec^2$

Answer: A

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7. A particle moves along a line according to the law $s = t^4 - 5t^2 + 8$. The intial velocity is

A. 1

B. 5

C. 4

D. 0

Answer: D

Watch Video Solution

8. The distance moved by the particle in time t is given by $s = t^3 - 12t^2 + 6t + 8$. At the instant when its acceleration is zero, the velocity is

A. 42

B. -42

C. 48

D. -48

Answer: B

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9. A particle moves along a line according to the law $s = 4t^3 - 3t^2 + 2$. At what time will the acceleration be equal to 42 unit/$\sec^2$?

A. 1 sec

B. 2 sec

C. 4 sec

D. 8 sec

Answer: B

Watch Video Solution

10. The distance form a fixed point O of a particle pmoving in a straight line from O is given by $s = 16 + 48t - t^3$. The direction of motion of the particle after $t = 4$ sec is

A. towards O

B. away from O

C. rest

D. none

Answer: A

Watch Video Solution

11. the distance s covered in time t by a particle moving along a straight line is given by $s = \sqrt{1 + t}$. Its acceleration is proportional to the ... of its velocitty at the instant

A. square

B. cube

C. double

D. none

Answer: B

Watch Video Solution

12. The velocity v and the distance s travelled by a particle has the relation $2 + 3v^2 = s^2$. Then acceleration is

A. s

B. $s/2$

C. $s / 3$

D. v

Answer: C

Watch Video Solution

13. The velocity v of a point moving along a line when it is at a distance x from the origin is given by $a + bv^2 = x^2$. Acceleration of the point at t is

A. x

B. x / b

C. x / bv

D. none

Answer: B

Watch Video Solution

14. The distance travelled by a particle in time t is given by $s = 10t - 7t^3$. The maximum velocity is

A. 10 unit/sec

B. 0

C. $8/3$ unit/sec

D. -3unit/sec

Answer: A

Watch Video Solution

15. For particle moving in a striaght line it is observed that tha distance x at time t is given by $x = 6t - \frac{1}{2}t^2$. The maximum velocity during the motion is

A. 3

B. 6

C. 9

D. 12

Answer: B

Watch Video Solution

16. A particle is moving along a straight line according to the law $s = 16 + 48t - t^3$. The distance travelled by the particle before coming to rest at an instant is

A. 100 unit

B. 120 unit

C. 144 unit

D. 136 unit

Answer: C

Watch Video Solution

17. A particle moving according to the law $s = 6t - \frac{1}{2}t^3$. At what time its velocity vanishes ?

A. 1 sec

B. 2 sec

C. 4 sec

D. 8 sec

Answer: B

Watch Video Solution

18. A particle is moving along a line according to the law $s = t^3 - 3t^2 + 5$. The acceleration of the particle at the instant where the velocity is zero is

A. 2 unit/sec^2

B. 4 unit/sec^2

C. 6 unit/sec^2

D. 8 unit/sec^2

Answer: C

Watch Video Solution

19. A particle is moving in a straight line with the relation between the time and the distance in such a way that $s = t^3 - 9t^2 + 24t - 18$. The value of its velocity when the acceleration is zero is

A. 10 unit/sec

B. 0

C. $8/3$ unit/sec

D. -3 unit/sec

Answer: D

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20. The distance s feet travelled by a particle in time t seconds is given by $s = t^3 - 6t^2 - 4t - 8$. It's acceleration vanishes at time t =

A. 2

B. 3

C. 4

D. 1

Answer: A

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21. A stone is thrown vertically up and the height s reached in time t is given by $s = 80t - 16t^2$. The stone reaches the maximum height in time t =

A. 2

B. 2.5

C. 3

D. 3.5

Answer: B

Watch Video Solution

22. A stone thrown upwards, has its equation of motion $s = 490t - 4.9t^2$. The the maximum height reached by it is

A. 24500

B. 12500

C. 12250

D. 25400

Answer: C

Watch Video Solution

23. A stone is projected vertically upwards with an intial velocity 112 ft/sec and moves such that $s = 112t - 16t^2$ where s is the distance from the starting point and t is the time. The greatest height reached by the stone is

A. 100 ft

B. 134 ft

C. 178 ft

D. 196 ft

Answer: D

Watch Video Solution

24. A stone projected vertically upward moves according to the law $s = 48t - 16t^2$. The time taken by the stone to reach the point of projection is

A. 1 sec

B. 2 sec

C. 3 sec

D. 6 sec

Answer: C

Watch Video Solution

25. A stone is thrown vertically up and the height s reached in time t is given by $s = 80t - 16t^2$. The stone reaches the maximum height in time t =

A. 2

B. 2.5

C. 3

D. 3.5

Answer: B

Watch Video Solution

26. The displacement of a body of mass 100kg in a retilinear motion is given by the formula $s = 2t^2 + 3t + 1$. The K.E. of the body 5 sec after the start is

A. 56000

B. 26450

C. 20000

D. none

Answer: B

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27. A car starts from rest and attains the speed of 10 km/hr repectively at the end of the first and second minute, If the car moves on a straight road, the distance travelled in 2 minute is

A. $1/3$ km

B. $1/4$ km

C. 15 km

D. 20 km

Answer: A

Watch Video Solution

28. A particle moves on a line according to the law $s = at^2 + bt + c$. If the displacement after one second is 16 cm, the velocity after 2 second is 24 cm/sec and the acceleration is 8 cm/$\sec^2$, then $(a, b, c) =$

A. (4, 8, 4)

B. (4, 4, 8)

C. (8, 4, 4)

D. (8, 8, 4)

Answer: A

Watch Video Solution

29. The point pis moving with uniform velocity v along a straight line AB. O isa point on a perpendicular to AB at A and distance l from it. The angular velocity of pabout O is

A. $\frac{lv^2}{OP}$

B. $\frac{l^2v}{OP}$

C. $\frac{lv}{op^2}$

D. $\frac{lv^2}{OP^2}$

Answer: C

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30. If the rate of decrease of $\frac{x^2}{2} - 2x + 5$ is twice the decrease of x, then x=

A. 2

B. 3

C. 4

D. 1

Answer: C

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31. If the rate of change in $y = 2x^3 + 3x^2 - 30x + 7$ is 6 times the rate of change in x, then x =

A. 1, 5

B. 1, -5

C. 2, 3

D. 2, -3

Answer: D

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32. At the point (2, 5) on the curve $y = x^3 - 2x + 1$ the gradient of the curve is increasing

A. 6 times

B. 12 times

C. 30 times

D. 10 times as fast as x

Answer: B

Watch Video Solution

33. The point on the parabola $x^2 = 8y$ for which the abscissa and ordinate changes at the same rate

A. (1, 1)

B. (1, 2)

C. (4, 2)

D. (2, 3)

Answer: C

Watch Video Solution

34. The point on the parabola $y^2 = 4x$ for which the abscissa and ordinate changes at the same rate

A. (1, 1)

B. (1, 2)

C. (4, 2)

D. (2, 3)

Answer: B

Watch Video Solution

35. A point on the parabola $y^2 = 18x$ at which the ordinate increases at twice the rate of the abscissa is

A. (2, 4)

B. $(9/8, 9/2)$

C. $(-9/8, 9/2)$

D. (2, -4)

Answer: B

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36. A particle moves along the curve $y = x^2 + 2x$. Then the point on the curve such that x and y coordinates of the particle change with the same rate

A. (1, 3)

B. $(1/2, 5/2)$

C. $(-1/2, -3/4)$

D. (-1, -1)

Answer: C

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37. The point on the circle $x^2 + y^2 = 2$ at which the abscissa and ordinate increase at the same rate is

A. (1, -1)

B. (1, 1)

C. (-1, -1)

D. none

Answer: A

Watch Video Solution

38. At what value of an angle the rates of change in sine and tangent of the same angle are equal

A. $2n\pi$

B. $n\pi$

C. $n\pi / 2$

D. none

Answer: A

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39. A point is moving on $y = 4 - 2x^2$. The x-coordinates of the point is decereasing at the rate of 5 units per second. The nthe rate at which y coordinates of the point is changing when the point is (1, 2) is

A. 5 unit/sec

B. 10 unit/sec

C. 15 unit/sec

D. 20 unit/sec

Answer: D

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40. If the rate of change in the radius of a circle is 0.02 cm/sec, then the rate of change in the area of the circle when the radius is 5 cm is

A. π sq.cm/sec

B. 0.05 sq.cm/sec

C. 0.2π sq.cm/sec

D. 3 sq.cm/sec

Answer: C

Watch Video Solution

41. The radius of a circular plate is increasing at the rate of 0.01 cm/sec when the radius is 12 cm. Then the rate at which the area increases is

A. 0.24π sq.cm/sec

B. 60π sq.cm/sec

C. 24π sq.cm/sec

D. 1.2π sq.cm/sec

Answer: A

Watch Video Solution

42. The radius of the circular disc increases at a uniform rate of 0.025 cm per sec. The rate at which the area of the disc increases, when the radius is 15 cm is

A. 0.75π sq.cm/sec

B. 30 sq.cm/sec

C. 30π sq.cm/sec

D. 0.4π sq.cm/sec

Answer: A

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43. If the rate of change in the radius of a circle is 0.5 sq.cm/sec, then the rate of change in the perimeter of the cirlce is

A. π cm/sec

B. 0.05 cm/sec

C. 0.2π cm/sec

D. 3 cm/sec

Answer: A

Watch Video Solution

44. If the rate of change in the area of a circle is π sq.cm/sec, then the rate of change in the radius of the circle when the radius is 10 cm is

A. π cm/sec

B. 0.05 cm/sec

C. 0.2π cm/sec

D. 3 cm/sec

Answer: B

Watch Video Solution

45. When a circular oil drop expands on water, its area increases at the uniform rate of 40 sq.cm per minute. The rate of increase in the radius when the radius 5 cm is

A. $4/\pi$ cm/m

B. $1/200$ cm/m

C. 8 cm/m

D. 4 cm/m

Answer: A

Watch Video Solution

46. A stone is dropped into a quiet pond and waves move in circles outward from the place where it strikes, at a speed of 30 cm per second. At the instant when the radius of the wave ring is 50 m, the rate of increases in the area of the wave ring is

A. 0.75π sq.cm/sec

B. 30 sq.cm/sec

C. 30π sq.m/sec

D. 0.4π sq.cm/sec

Answer: C

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47. A stone is dropped into a quiet pond and waves move in circles outward from the place where it strikes, at a speed of 30 cm per second. At the instant when the radius of the wave ring is 50 m, the rate of increases in the circumference of the wave ring is

A. 0.6π m/sec

B. 6π m/sec

C. 0.6π cm/sec

D. 6π cm/sec

Answer: A

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48. If the rate of change of area of a circle is equal to tha rate of change of its diameter then its radius =

A. $2/\pi$

B. $1/\pi$

C. $\pi/2$

D. π

Answer: B

Watch Video Solution

49. The side of a square increases at therate of 1 cm per second. The rate at which perimeter increases is

A. 2 cm/sec

B. 4 cm/sec

C. 5 cm/sec

D. 3 cm/sec

Answer: B

Watch Video Solution

50. If the rate of change of the side of a square is 0.05 cm/sec, then the rate of change in the area of the square when the side is 10cm is

A. 0.5 sq.cm/sec

B. 1 sq.cm/sec

C. 5 sq.cm/sec

D. 10 sq.cm/sec

Answer: B

Watch Video Solution

51. the side of a square is equal to the diameter of a circle. Ifthe side and radius change at the same rate then the ratio of the change of their areas is

A. $1:\pi$

B. $\pi:1$

C. $2:\pi$

D. $1:2$

Answer: C

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52. Two parallel sides of a rectangle are being lengthened at the rate of 2 cm/sec while the other two sides are shortened in such a way that the aea of the rectangle is 50 sq.cm. The rate of change of the perimeter when the length of an increasing side 5 cm is

A. 2 cm/sec

B. 6 cm/sec

C. -2 cm/sec

D. -4 cm/sec

Answer: D

Watch Video Solution

53. A rectangular vessel is of 2 mt long, 0.5 mt breadth and 1 mt deep. If water flows in at the rate of 900 cubic cm per sec, then the rate of increase of water level when 25 cm deep is

A. 0.09 cm/sec

B. 0.1 cm/sec

C. 0.01 cm/sec

D. 0/5 c/sec

Answer: A

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54. Each side of an equilateral triangle expands at the rate of 2 cm/sec. The rate of increase of its area when each side is 10 cm is (in cm^2/sec)

A. $10\sqrt{2}$

B. $10\sqrt{3}$

C. 10

D. 5

Answer: B

Watch Video Solution

55. The side of an equilateral triangle increases at the uniform rate of 0.05 cm/sec. The rate of increase in the area of the triangle when the side is 20 cm is

A. 3 sq.cm/sec

B. $\sqrt{3}/2$ sq.cm/sec

C. 1.2 sq.cm/sec

D. 4π sq.cm/sec

Answer: B

Watch Video Solution

56. At a given instant the legs of a right angled triangle are 8 inch and 6 inch respectively. The first leg decreases at 1 inch per minute and second increases at 2 inch per minute. The rate of increasing of the area after 2 minute is

A. 1 sq.inch/min

B. 2 sq.inch/min

C. 3 sq.inch/min

D. 4 sq.inch/min

Answer: A

Watch Video Solution

57. A variable triangle ABC is inscribed in a circle of diameter x units. At a particular instant the rate of change of side 'a' is x/2 time the rate of change of the opposite angle A then A =

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. π

Answer: B

Watch Video Solution

58. A spherical balloon is filled with 4500π cubic meters of helium gas. If a leak in the balloon causes the gas to escape at the ratio of 72π cubic meters per minute, then the rate (in meters per minute) at which the radius of the balloon decreases 49 minutes after the leakage began is

A. $2/9$

B. $9/2$

C. $9/7$

D. $7/9$

Answer: B

Watch Video Solution

59. Gas is leaking out of a spherical balloon at the rate of 1800 cubic cm per sec. When the radius of the balloon is 720 cm, the rate at which the surface area is shrinking is

A. 5 sq.cm/sec

B. 6 sq.cm/sec

C. 10 sq.cm/sec

D. 15 sq.cm/sec

Answer: C

Watch Video Solution

60. The volume of a metal hollow sphere is constant. If the outer radius is increasng at the rate of $\frac{1}{4}$ cm per sec. The rate at which the inner radius is increasing when the radii are 8 cm and 4 cm repectively is

A. 4 cm/sec

B. 3 cm/sec

C. 2 cm/sec

D. 1 cm/sec

Answer: A

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61. The side of a cube is equal to the diameter of a sphere. If the side and radius increase at the same rate then the ratio of the increase of their surfaces is

A. $\pi : 6$

B. $2\pi : 3$

C. $3 : 2\pi$

D. $3 : \pi$

Answer: D

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62. The side of a cube is equal to the radius of a shpere. If the side and the radius increase at the same rate, then the relation between the rates of change of surface areas of the cube and sphere respectively is

A. $<$

B. $>$

C. $=$

D. none

Answer: A

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63. If the rates of increase of side of a cube and radius of a sphere are equal and rates of increase of their volumes are in the ratio 2 : 1, then the ratio of the squares of side and radius =

A. $2\pi : 3$

B. $3\pi : 2$

C. $2 : 3\pi$

D. $8\pi : 3$

Answer: D

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64. The bas radius of a cylindrical vessel full of oil is 30 cm. Oil is drawn at the rate of 27000 cubic cm per minute. The rate at which the level of he oul is falling in the vessel is

A. $30/\pi$ cm/sec

B. π cm/sec

C. $\pi/30$ cm/sec

D. 30 cm/sec

Answer: A

Watch Video Solution

65. Oil is being filled in a cylindrical tank of diameter 12 mt. The rate of increase in the height of oil corresponding to the rate of increase 1800π cubic cm minute in its volume is

A. 1/200 cm/m

B. 200 cm/m

C. -200 cm/m

D. $-1/200$ cm/m

Answer: A

Watch Video Solution

66. Water is flowing into cylindrical tank of radius 7 ft in the rate of 22c.ft per sec. How fast is the water level increasing ?

A. 1 ft/sec

B. 1/7 ft/sec

C. 2/7 ft/sec

D. 7/2 ft/sec

Answer: B

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67. The diameter and altitude of a right circular cylinder are found at a certain instant to be 20 cm and 40 cm repectively. It=f the diameter is increasing at the rate of 2 cm/sec then the rate of change in the altitude will keep the volume constant is

A. 2 cm/sec

B. 4 cm/sec

C. 6 cm/sec

D. -8 cm/sec

Answer: D

Watch Video Solution

68. The diameter and altitude of a right circular cylinder are found at a certain instant to be 20 cm and 40 cm repectively. It=f the diameter is increasing at the rate of 2 cm/sec then the rate of change in the altitude will keep the volume constant is

A. 2 cm/sec

B. 4 cm/sec

C. 6 cm/sec

D. -8 cm/sec

Answer: D

Watch Video Solution

69. An inverted cone has a depth of 10 cm and a base of radius 5 cm. Wateer is poured in to it at the rate of 1.5 cubic cm per second. The rate at which water is rising when the depth is 4 cm is

A. 0.5 cm/sec

B. $5 / \pi$ cm/sec

C. $3 / 8\pi$S cm/sec

D. $8 / 3\pi$ cm/sec

Answer: C

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70. The radius of the base and depth of a conical funnel are 20 cm and 40 cm repectively. Water flows from the funnel at the rate 2.25 cm/sec. The rate at which the water level decreases when altitude is 30 cm is

A. $\frac{5}{8\pi}$ cm/sec

B. $\frac{1}{100\pi}$ cm/sec

C. $\frac{5}{12\pi}$ cm/sec

D. $\frac{1}{120\pi}$ cm/sec

Answer: B

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71. Water is being poured in to the inverted conical vessel at the rate of 1.5 cubic meter per minute. Its depth is always equal to twice its radius. The level of water is rising at the rate of $3/8\pi$ meter oer minute when its depth is

A. 1 mt

B. 2 mt

C. 3 mt

D. 4 mt

Answer: D

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72. Sand is being poured on the ground from the orifice of an elevated pipe and forms a pile which has always the shape of a right circular cone whose height is equal to the radius of the base. If the sand is falling at the rate of 6 cubic ft per sec, the rate at which the height of the pile is rising when the height is 5 ft is

A. $5/8\pi$ cm/sec

B. $\frac{1}{100}\pi$ cm/sec

C. $5/12\pi$ cm/sec

D. $\frac{1}{120}\pi$ cm/sec

Answer: A

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73. Sand is being poured on the ground from the orifice of an elevated pipe and forms a pile which has always the shape of a right circular cone whose height is equal to the radius of the base. If the sand is falling at the rate of 6 cubic ft per sec, the rate at which the height of the pile is rising when the height is 5 ft is

A. $9/4\pi$ ft/sec

B. $3/8\pi$ ft/sec

C. $7/23\pi$ ft/sec

D. $6/25\pi$ ft/sec

Answer: D

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74. Water flows into a conical vessel at the rate of 5 cubic cm per second. If the semivertical angle of the vessel is 30°, then the rate of increase of water level when the water level in the vessel is 6 cm is

A. $\frac{5}{8\pi}$ cm/sec

B. $\frac{1}{100\pi}$ cm/sec

C. $\frac{5}{12\pi}$ cm/sec

D. $\frac{1}{120\pi}$ cm/sec

Answer: C

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75. A conical vessel of height 10 ft and semivertical angle 30° is full of water. It empties in such a way that the height of water in the vessel is decreasing at a constant rate of 1 inch per minute. The rate of which the volume of water in the vessel is decreasing when its height is 6 ft is

A. π c.ft/sec

B. 2π c.ft/sec

C. $1/2\pi$ c.ft/sec

D. 3π c.ft/sec

Answer: A

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76. The radius of the base of a cone is increasing at the rate of 3 cm/min and altitude is decreasing at the rate of 4 cm/min. The rate of change of lateral surface when the radius is 7 cm and altitude is 24 is

A. 63π sq.cm/min

B. 84π sq.cm/min

C. 72π sq.cm/min

D. 96π sq.cm/min

Answer: D

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77. The slant height of a cone is fixed as 7 cm. If the rate of increase in tis height os 0.3 cm/sec, then the rate of increase of volume when height 4 cm is

A. $\pi / 2$ cc/sec

B. π cc/sec

C. $\pi / 5$ cc/sec

D. $\pi / 10$ cc/sec

Answer: D

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78. If the semivertical angle of a cone is 45° then the rate of change of volume of the cone is

A. curved area times the rate of change of r

B. base area times the rate of change of l

C. base area times the rate of change of r

D. none

Answer: C

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EXERCISE 1D (MEAN VALUE THEOREMS)

1. The constant c of Rolle's theorem for the function $f(x) = 2x^3 + x^2 - 4x - 2$ in $\left[-\sqrt{2}, \sqrt{2}\right]$ is

A. 0

B. 1

C. $\frac{1}{2}$

D. $\frac{2}{3}$

Answer: D

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2. The constant c of Rolle's theorem for the function $f(x) = (x - a)(x - b)$ in [a,b] is

A. $\sqrt{ab}$

B. $\frac{a+b}{2}$

C. $\frac{a-b}{2}$

D. $\frac{b-a}{2}$

Answer: B

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3. The constant c of rolle's theorem for the function $f(x) = \log\frac{x^2 + ab}{(a+b)x}$ in [a,b] where $0 \notin [a, b]$ is

A. $\sqrt{ab}$

B. $\frac{a+b}{2}$

C. $\frac{a-b}{2}$

D. $\frac{b-a}{2}$

Answer: A

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4. The constant c of Rolle's theorem for the function $f(x) = (x-a)^m(x-b)^n$ in [a,b] where m,n are positive integers, is

A. $\frac{a+b}{2}$

B. $\frac{ma+nb}{m+n}$

C. $\frac{mb+na}{m+n}$

D. none

Answer: C

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5. The constant 'c' of Rolle's theorem for the function $f(x) = \sin x$ in $[0, 2\pi]$ is

A. $\pi/6$

B. $\pi/3$

C. $\pi/4$

D. $\pi/2$

Answer: D

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6. If a+b+c=0 then the quadratic equation $3ax^2+2bx+c=0$ has at least one root in

A. (0,1)

B. (1,3)

C. (2,3)

D. (-1,0)

Answer: A

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7. If 2a+3b+6c=0 , then at least one root of the eqution $ax^2+bx+c=0$ lies in the interval

A. (0,1)

B. (1,3)

C. (2,3)

D. (1,2)

Answer: A

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8. Rolle's theorem can not applicable for

A. $f(x) = x^3 - 6x^2 + 11x = 6 \text{in}[1, 3]$

B. $f(x) = \sin x \text{in}[0, \pi]$

C. $f(x) = 1 - (x - 1)^{2/3} \text{in}[0, 2]$

D. $f(x) = x^2 - 3x + 2 \text{in}[1, 2]$

Answer: C

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9. Rolle's theorem can not applicable for

A. $f(x) = \sqrt{1 - x^2} \text{in}[-1, 1]$

B. $f(x) = |x| \text{in}[-1, 1]$

C. $f(x) = x^2 - 1 \text{in}[-1, 1]$

D. $f(x) = x^3 + x^2 - x - 1 \text{in}[-1, 1]$

Answer: B

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10. The constant c of the Lagrange's mean value theorem for the function $f(x) = 1 + x^2$ on [1,2] is

A. $5/4$

B. $3/2$

C. $7/4$

D. $9/8$

Answer: B

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11. The constant c of Lagrange's theorem for $f(x) = x^3 - 4x^2 + 4x$ "in" [0,2] is

A. 1

B. $1/2$

C. $2/3$

D. $3/2$

Answer: C

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12. The constant c of Lagrange's theorem for $f(x) = x(x-1)(x-2) \text{in} [0, 1/2]$ is

A. $\frac{1}{4}$

B. $\frac{6+\sqrt{21}}{6}$

C. $\frac{6-\sqrt{21}}{6}$

D. $\frac{\sqrt{21}-6}{6}$

Answer: C

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13. The constant c of Lagrange's theorem for $f(x) = (x-1)(x-2)(x-3) \text{in} [0, 4]$ is

A. $1 \pm \frac{2}{\sqrt{3}}$

B. $2 \pm \frac{2}{\sqrt{3}}$

C. $3 \pm \frac{2}{\sqrt{3}}$

D. $4 \pm \frac{2}{\sqrt{3}}$

Answer: B

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14. The constant c of Lagrange's theorem for $f(x) = \frac{x}{x-1} \text{in}[2, 4]$ is

A. 1

B. $\sqrt{3}$

C. $\sqrt{3} + 1$

D. $\sqrt{3} + 2$

Answer: C

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15. The constant c of Lagrange's mean value theorem for $f(x) = 2\sin x + \sin 2x \text{in}[0, \pi]$ is

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: C

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16. A value of c for which the conclusion of Mean value Theorem holds for the function $f(x) = \log_e x$ on the interval [1,3] is

A. $2 \log_3 e$

B. $\frac{1}{2} \log_e 3$

C. $\log_3 e$

D. $\log_e 3$

Answer: A

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17. The value of c in the Lagrange's mean - value theorem for $f(x) = \sqrt{x-2}$ in the interval [2,6] is

A. $\frac{5}{2}$

B. 3

C. 4

D. $\frac{9}{2}$

Answer: B

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18. The constant c of Lagrange's theorem for $f(x) = lx^2 + mx + n(\ln e0)$ in [a,b] is

A. $\frac{a+b}{2}$

B. $\frac{b-a}{2}$

C. $\frac{a-b}{2}$

D. $\frac{a+b}{3}$

Answer: A

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19. The constant c of Lagrange's theorem for $f(x) = lx^2 + mx + n(\ln e0)$ in [a,b] is

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{6}$

Answer: A

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20. The constant θ of Lagrange's theorem for $f(x) = x^2 - 2x + 3$ in [1,3/2] is

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{6}$

Answer: A

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21. Lagrange's theorem can not be applicable for

A. $f(x) = x^2 \text{in}[1, 2]$

B. $f(x) = x^3 \text{in}[-1, 1]$

C. $f(x) = x \text{in}[-1, 1]$

D. $f(x) = \frac{1}{x} \text{in}[-1, 1]$

Answer: D

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22. Lagrange's theorem can not be applicable for

A. $f(x) = \sqrt{x^2} - 4 \text{in}[2, 4]$

B. $f(x) = |x| \text{in}[-1, 2]$

C. $f(x) = x - \frac{1}{x} \text{in}[1, 3]$

D. $f(x) = \log x \text{in}[1, e]$

Answer: B

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23. If f(x) satisfies Lagrange's mean value theorem in [a,b] then there exists $c \in (a, b)$ such that

A. $f'(c) = 0$

B. $f'(c) = f(b) - f(a)$

C. the tangent at x=c to the curve y=f(x) is parallel to the chord joining x=a,x=b

D. the tangent at x=c to the curve y=f(x) is perpendicular to the chord joining x=a,x=b

Answer: C

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24. The constant c of Cauchy's mean value theorem for $f(x) = x^2, g(x) = x^3 \text{in} [1, 2]$ is

A. $5/3$

B. $5/4$

C. $15/7$

D. $14/9$

Answer: D

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25. The constant c of Cauchy's mean value theorem for $f(x) = \sqrt{x}, g(x) = 1/\sqrt{x}in[a, b]$ where $0 < a < b$ is

A. $\sqrt{ab}$

B. $\dfrac{a+b}{2}$

C. $\dfrac{2ab}{a+b}$

D. $\dfrac{1}{a} + \dfrac{1}{b}$

Answer: A

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26. The constant c of cauchy's mean value theorem for the functions $f(x) = \sqrt{x}, g(x) = 1/\sqrt{x}$ in [1,2] is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $3/2$

D. $5/4$

Answer: A

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27. The constant c of Cauchy's mean value theorem for $f(x)=e^x, g(x)=e^{-x}\text{in}[a, b]$ is

A. $\sqrt{ab}$

B. $\frac{a+b}{2}$

C. $\frac{2ab}{a+b}$

D. $\frac{1}{a}+\frac{1}{b}$

Answer: B

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28. If f and g are differentiable functions in [0,1] satifying f(0)=2=g(1),g(0)=0 and f(1) =6 , then for some $c \in (0, 1)$

A. $f'(c) = g'(c)$

B. $f'(c) = 2g'(c)$

C. $2f'(c) = g'(c)$

D. $2f'(c) - 3g'(c)$

Answer: B

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EXERCISE 1E (MAXIMA AND MINIMA)

1. If $x > 0$, then $f(x) = x^3 + 3x$ is

A. decreasing

B. increasing

C. oscillating

D. none

Answer: B

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2. The function $f(x) = 3x^2 - 4x$ is increasing in

A. $(2/3, \infty)$

B. $(2/3, 4)$

C. $(2/3, 2)$

D. $(2/3, 3/2)$

Answer: A

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3. The function $f(x) = 10 - x^3 + 3x$ is increasing in

A. $(-1/3, 1/3)$

B. $(2/3, 0)$

C. $(-1, 1)$

D. $(2/3, 3/2)$

Answer: C

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4. The function $f(x) = 3 + 12x - 9x^2 + 2x^3$ is increasing in

A. $(2/3, \infty)$

B. $(1, 5)$

C. $(2/3, 4)$

D. $(-\infty, 1) \cup (2, \infty)$

Answer: D

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5. The function $f(x)\sqrt{9 - x^2}$ is increasing in

A. $(-3, 0)$

B. $(0, 4)$

C. $(-4, 0)$

D. R

Answer: A

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6. The function xe^x is increasing in

A. $(-3, 0)$

B. $(0, 4)$

C. $x > -1$

D. $(1/e, \infty)$

Answer: C

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7. If f(x)=log $(1+x)-\frac{2x}{2+x}$ is increasing , then..........

A. $0 < x < \infty$

B. $-\infty < x < 0$

C. $-\infty < x < \infty$

D. $1 < x < 2$

Answer: A

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8. The function $f(x) = \cot^{-1} x + x$ increasing in the interval

A. $(1, \infty)$

B. $(0, \infty)$

C. $(-\infty, \infty)$

D. $(0, \infty)$

Answer: C

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9. The function log (log x) in increasing in

A. $(1, \infty)$

B. $(0, \infty)$

C. ∞

D. R

Answer: A

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10. The function sinh (sin x) increasing in

A. $(1, \infty)$

B. $(0, \infty)$

C. ∞

D. $\left(2n\pi - \frac{\pi}{2}, 2n\pi + \frac{\pi}{2}\right)(n \in Z)$

Answer: D

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11. The function sin (tanh x) increases in

A. 0

B. R

C. 1

D. ∞

Answer: B

Watch Video Solution

12. The function $\tan^{-1}$ (sin x) increasing in

A. $\left(2n\pi - \frac{\pi}{2}, 2n\pi + \frac{\pi}{2}\right)(n \in Z)$

B. $\left(2n\pi + \frac{\pi}{2}, 2n\pi + \frac{3\pi}{2}\right)(n \in Z)$

C. $\left(2n\pi + \frac{\pi}{4}, 2n\pi + \frac{\pi}{2}\right)(n \in Z)$

D. $\left(2n\pi - \frac{\pi}{2}, 2n\pi + \frac{3\pi}{2}\right)(n \in Z)$

Answer: A

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13. The function $f(x) = \tan^{-1}$ (sin x+ cos x) is an increasing function in

A. $(\pi/4, \pi/2)$

B. $(-\pi/2, \pi/4)$

C. $(0, \pi/2)$

D. $(-\pi/2, \pi/2)$

Answer: B

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14. $f(x)=\dfrac{x^2}{x+2}$ is increasing in

A. $(-2,0)$

B. $(-4,-2)$

C. $(-4,0)$

D. $(0,\infty)$

Answer: D

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15. The interval of increasing for $y = x - 2\sin x$, $[0, 2\pi]$ is

A. $(0, \pi)$

B. $(\pi / 3, \pi)$

C. $(\pi / 2, \pi)$

D. $(0, \pi / 3)$

Answer: B

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16. The interval in which $f(x) = 2x^2 - \log x$ increasing

A. $(-1/2, 0)$

B. $(0, 1/2)$

C. $(-\infty, -1/2)$

D. $(1/2, \infty)$

Answer: D

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17. The function $\frac{\log x}{x}$ is increasing in

A. (1,2e)

B. (0,e)

C. (2,2e)

D. (1/e,2e)

Answer: B

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18. The values of x for which $x^3 - 6x^2 - 36x + 7$ increasesare

A. R

B. ϕ

C. (-2,6)

D. $(-\infty, -2) \cup (6, \infty)$

Answer: D

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19. The values of x for which $2x^3 - 3x^2 - 36x + 10$ has extreme values are

A. R

B. (-2,3)

C. $(2/3, \infty)$

D. $(-\infty, -2) \cup (6, \infty)$

Answer: B

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20. The value of x for which $x^2 + \frac{250}{x}$ has extreme values are

A. R

B. (-2,3)

C. (-2,6)

D. 5

Answer: D

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21. The values of x for which (x-1) (x-2) (x-3) has extreme values are

A. 1,2

B. e

C. $2 \pm 1 / \sqrt{3}$

D. 1

Answer: C

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22. f(x) = sin x is increasing in

A. $(\pi/2, \pi)$

B. $(\pi, 3\pi/2)$

C. $(3\pi/2, 2\pi)$

D. none

Answer: C

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23. The function x- log $\left(\frac{1+x}{x}\right)(x > 0)$ is increasing in

A. $(1, \infty)$

B. $(0, \infty)$

C. $(2, 2e)$

D. $(1/e, 2e)$

Answer: B

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24. The function $f(x) = x^3 - 9x^2 + 15x + 25$ is decreasing in

A. ϕ

B. R

C. (1,5)

D. $(-\infty, 1) \cup (5, \infty)$

Answer: C

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25. The function $f(x)\sqrt{25-4x^2}$ is decreasing in

A. (-3,0)

B. (0,5/2)

C. (-5/2,0)

D. R

Answer: B

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26. The function $f(x)=\dfrac{\log x}{x}$ decreases in

A. $(-\infty, e)$

B. (e, ∞)

C. $(0, e)$

D. none

Answer: B

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27. The function x^x is decreases in

A. (0,1/e)

B. (0,4)

C. (-4,0)

D. $(1/e, \infty)$

Answer: A

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28. The function $f(x) = x^3(x-2)^2$ decreases in

A. $(0, \infty)$

B. ∞

C. (6/5,2)

D. R

Answer: C

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29. The function cosh (cos x) decreases in

A. $$\left(2n\pi+\frac{\pi}{2}, 2n\pi+\pi\right)\cup\left(2n\pi+\frac{3\pi}{2}, (2n+2)\pi\right)(n\in Z)$$

B. $\left(2n\pi, 2n\pi+\frac{\pi}{2}\right)\cup\left(2n\pi+\pi, 2n\pi+\frac{3\pi}{2}\right)(n\in Z)$

C. $\left(2n\pi, 2n\pi+\frac{\pi}{2}\right)\cup\left(2n\pi+\pi, 2n\pi+\frac{3\pi}{2}\right)(n\in Z)$

D. $\left(2n\pi+\frac{\pi}{2}, 2n\pi+\frac{3\pi}{2}\right)(n\in Z)$

Answer: B

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30. The set of all values of a for which the function $f(x)=\left(\frac{\sqrt{1+4}}{1-a}-1\right)x^5-3x+\log 5$ decreases for all real x is

A. $(-\infty, \infty)$

B. $\left[-4, \frac{3-\sqrt{21}}{2}\right] \cup (1, \infty)$

C. $(1, \infty)$

D. $\left[-3, \frac{3-\sqrt{27}}{2}\right] \cup (2, \infty)$

Answer: B

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31. f (x) = sec x is decreasing in `

A. $(-\pi/2, 0)$

B. $(0, \pi/2)$

C. $(\pi/2, \pi)$

D. $(-\pi/2, \pi/2)$

Answer: A

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32. $f(x) = \cos^{-1}$ x is decreasing in

A. (-1,0)

B. $(0, \pi/2)$

C. (-1,1)

D. none

Answer: C

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33. $f(x) = \frac{x}{a} + \frac{a}{x} (a > 0)$ is decreasing in

A. $-a \leq x \leq a$

B. $0 < x < a$

C. $-a < x < a$

D. $(-a, 0), \cup (0, a)$

Answer: D

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34. The value of f(0) so that $f(x) = \frac{\sin x}{x}$ is continuous at x=0 is

A. increasing in $(0, \pi/2)$

B. decreasing in $(0, \pi/2)$

C. stationary at $x = \pi/2$

D. none

Answer: B

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35. The function $\frac{1n(1+x)}{x}\text{in}(0, \infty)$ is

A. increasing

B. decreasing

C. not decreasing

D. not increasing

Answer: B

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36. The function $\frac{1n(1+x)}{x}\text{in}(0, \infty)$ is

A. increasing

B. not decreasing

C. decreasing

D. not increasing

Answer: C

Watch Video Solution

37. The increasing function in $(0, \pi/4)$ is

A. cos x + sin x

B. cos x - sin x

C. $\frac{\sin x}{x}$

D. $\frac{x}{\sin x}$

Answer: A

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38. In the interval $(\pi/2, \pi)$

A. f(x) =cot x is increasing

B. f(x) =cos x is decreasing

C. f(x) tan x is decreasing

D. none

Answer: B

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39. In the interval $(0, \infty)$

A. f(x)=|x| is increasing

B. $f(x) = e^x$ is decreasing

C. f(x) cos x is increasing

D. none

Answer: A

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40. In the interval (-3,3) the function $f(x) = \frac{x}{3} + \frac{3}{x}, x \neq 0$ is

A. increasing

B. decreasing

C. neither increasing nor decreasing

D. partly increasing and partly decreasing

Answer: B

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41. If $y = x^3 - ax^2 + 12x + 5$ is increasing for all values of x, then a lies between

A. $-12, 12$

B. $-11, 11$

C. $-6, 6$

D. $-10, 10$

Answer: C

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42. The set of all x for which sin x $\leq$ x is

A. $(0, \infty)$

B. $(-1, \infty)$

C. $(-1, 0)$

D. $(0, \infty)$

Answer: D

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43. tan x $>$ x when x lies in

A. $(0, \pi/2)$

B. $(\pi/2, \pi)$

C. $(-\pi/2, 0)$

D. none

Answer: A

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44. The larger of sin x+ tan x,2x in $0 < x < \pi / 2$ is

A. sin x +tan x

B. 2x

C. cannot be determined

D. none

Answer: A

Watch Video Solution

45. The set of all x for which sin x $\leq$ x is

A. $(-\infty, 1)$

B. $(0, \infty)$

C. $[-1, 1]$

D. $(-\infty, \infty)$

Answer: B

Watch Video Solution

46. If $x < 0$ then $f(x) = x^2 - x$ is

A. increasing

B. decreasing

C. none

D. none

Answer: B

Watch Video Solution

47. For real values of x, the function x-sin x is

A. decreasing

B. increasing

C. not decreasing

D. not increasing

Answer: C

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48. f(x) =x-1/x is

A. increasing in R

B. decreasing in R^{+}

C. increasing in $R - \{0\}$

D. none

Answer: C

Watch Video Solution

49. If f(x) =sin x -bx+c decreasing along the entire number scale then

A. $b \geq 1$

B. $b > 1$

C. $b \leq 1$

D. $b < 1$

Answer: B

Watch Video Solution

50. If the function $f(x) = 2x^2 - kx + 5$ is increasing on [1,2] then k lies in the interval

A. $(-\infty, 4)$

B. $(4, \infty)$

C. $(-\infty, 8)$

D. $(8, \infty)$

Answer: A

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51. If $f(x) = x^3 + ax^2 + bx + 5\sin^2 x$ is an increasing function on R, then

A. $a^2 - 3b - 15 > 0$

B. $a^2 - 2b + 15 > 0$

C. $a^2 - 3b + 15 < 0$

D. $a > 0$ and $b > 0$

Answer: C

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52. If $f(x) = kx^3 - 9x^2 + 9x + 3$ is increasing on R,then

A. $k < 3$

B. $k > 3$

C. $k \leq 3$

D. none

Answer: B

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53. The values of 'a' for which the function $(a+2)x^3 - 3ax^2 + 9ax - 1$ decreases monotonically throughout for all real x are

A. $a < -2$

B. $a > -2$

C. $-3 < a < 0$

D. $-\infty < a \leq -3$

Answer: D

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54. The value of a such that $x^3 - ax^2 + 48x + 1$ increasing on R is

A. $|a| \leq 12$

B. $a \leq 12$

C. 12

D. |a|

Answer: A

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55. The values of a,b such that $x^3 + 3ax^2 + 3a^2x + b$ is increasing on R-{-a} are

A. 1,2

B. a,b are any real numbers

C. $(\,-1, 2)$

D. ± 1

Answer: B

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56. The function $f(x) = x^3 + ax^2 + bx + c,\, a^2 \leq 3b$ has

A. positive real numbers $\in a^2 \leq 3b$

B. real numbers $\in a^2 \leq 3b$

C. negative real numbers $\in a^2 \leq 3b$

D. none

Answer: B

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57. The function $f(x) = x^3 + ax^2 + bx + c, a^2 \leq 3b$ has

A. one maximum value

B. one minimum value

C. no extreme value

D. one maximum and one minimum value

Answer: B

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58. The condition for $f(x) = x^3 + px^2 + qx + r', x \in R)$ to have no extreme value , is

A. $p^2 < 3q$

B. $2p^2 < q$

C. $p^2 < \frac{1}{4}q$

D. $p^2 > 3q$

Answer: A

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59. The condition that $f(x) = ax^3 + bx^2 + cx + d$ has no extreme value is

A. $b^2 = 4ac$

B. $b^2 = 3ac$

C. $b^2 < 3ac$

D. $b^2 > 3ac$

Answer: C

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60. The condition $f(x) = \frac{x}{\log x}$ has minimum value at x=

A. $3/2$

B. e

C. $-e$

D. 1

Answer: B

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61. The function $f(x)=xe^{-x}(x\in R)$ attains a maxium value at x= .....

A. 2

B. $\frac{1}{e}$

C. 1

D. 3

Answer: C

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62. f(x) = sin x(1+ cos x) has maximum value at x=

A. 0

B. π

C. $\frac{\pi}{3}$

D. 1

Answer: C

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63. $f(x) = \sin^m x \cos^n x$ has maximum value at x=

A. $\tan^{-1} \sqrt{m/n}$

B. m/n

C. mn

D. 1

Answer: A

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64. The function $y = 2x^3 - 3x^2 - 12x + 8$ has minimum at x=

A. -1

B. 2

C. $-1/2$

D. $3/2$

Answer: B

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65. The function $y = x^4 - 6x^2 + 8x + 11$ has a minimum at x=

A. 1

B. -2

C. 3

D. 4

Answer: B

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66. The function x (x-1) (x-2) attains its maximum value when x is

A. 1

B. $1+\frac{a}{\sqrt{3}}$

C. $1-\frac{1}{\sqrt{3}}$

D. $1 \pm \sqrt{3}$

Answer: C

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67. The function $f(x)=\frac{x}{2}+\frac{2}{x}$ has a local minimum at

A. x=0

B. x=1

C. x=2

D. x=-2

Answer: C

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68. The function $f(x) = x^5 - 5x^4 + 5x^3 - 1$ has

A. one minimum and two maxima

B. two minima and one maximum

C. two minima and two maxima

D. one minimum and one maximum

Answer: D

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69. Let f(x) $= a_0 + a_1x^2 + a_2x^4 + \ldots\ldots + a_nx^{2n}$ be a polynomial in $x \in R$ with $0 < a_0 < a_1 < \ldots\ldots < a_n$ then f(x) has

A. neither a maximum nor a minimum

B. only one maximum

C. only one minimum

D. none

Answer: C

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70. $f(x) = (\sin^{-1} x)^2 + (\cos^{-1} x)^2$ is stationary at

A. $x = 1/\sqrt{2}$

B. $x = \pi/4$

C. x=1

D. x=0

Answer: A

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71. f(x) =|x| has

A. minimum at x=0

B. maximum at x=0

C. neither max nor min at x=0

D. none

Answer: A

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72. The function which has neither maximum nor minimum at x=0 is

A. $f(x) = x^2$

B. $f(x) = \cos x$

C. $f(x) = x^3 - 8$

D. f(x) = cosh x

Answer: C

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73. The function f(x) =tan x has

A. no max points

B. no min points

C. neither max nor min points

D. none

Answer: C

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74. $f(x) = \tanh^{-1} x$ is

A. increasing in (-1,1)

B. decreasing in (-1,1)

C. max at x=0

D. min at x=0

Answer: A

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75. The least value of (x-a) (x-b) occurs at x=

A. G.M of a,b

B. A.M of a,b

C. H.M of a,b

D. a+b

Answer: B

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76. Maximum value of $\frac{x}{(x+a)(x+b)}$ occurs when x=

A. A.M of a,b

B. G.M of a,b

C. H.M of a,b

D. none

Answer: B

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77. In the interval [0,1] the function $x^{25}(1-x)^{75}$ takes a maximum value at

A. 0

B. $1/4$

C. $1/2$

D. $1/3$

Answer: B

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78. The stationary point of $f(x) = 2x^3 - 9x^2 + 12x - 3$ is

A. $(1, 5), (5, 1)$

B. $(1, 2), (2, 1)$

C. $(5, 25)$

D. $(5, 75)$

Answer: B

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79. The stationary point of $x^2 + \frac{16}{x}$ is

A. (2,12)

B. (1,2)

C. (1,12)

D. (1,1)

Answer: A

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80. The stationary point of x^x is

A. $\left(e^{-1}, e^{-1/e}\right)$

B. (e,1/e)

C. (1,12)

D. (1,1)

Answer: A

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81. The stationary points of $2x^3 - 9x^2 - 24x + 16$ are

A. $(-1, 29), (4, -96)$

B. (1,29)

C. (1,1)

D. none

Answer: A

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82. The stationary value of $f(x) = \frac{\log x}{x}$ is

A. 0

B. 1

C. e

D. $1/e$

Answer: D

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83. The stationary value of $(x-2)^{2/3}(2x-4)$ is

A. 0

B. 2

C. 3

D. none

Answer: A

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84. The stationary value of $8x^2 - x^4 - 4$ is

A. 1,2,1

B. $-4, 12, 12$

C. 3,6,8

D. none

Answer: B

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85. The stationary values of $f(x) = x(\log x)^2$ are

A. $-1, 4/e$

B. $1, e^{-2}$

C. $1, 4e^2$

D. none

Answer: D

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86. The turning values of $x^3 - 3px + q(p > 0)$ are

A. $q+2p\sqrt{p}, q-2p\sqrt{p}$

B. $q+p, q-p$

C. $2p, 3p$

D. none

Answer: A

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87. If x=-1 and x=2 are extreme points of $f(x)=\alpha\log|x|+\beta x^2+x$ then

A. $\alpha=2, \beta=-\frac{1}{2}$

B. $\alpha=2, \beta=\frac{1}{2}$

C. $\alpha=-6, \beta=\frac{1}{2}$

D. $\alpha = -6, \beta = -\frac{1}{2}$

Answer: A

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88. The value of 'a' for which the function f(x) = $a \sin x + \frac{1}{3} \sin 3x$ has an extremum at $x = \pi / 3$ is

A. 1

B. -1

C. 0

D. 2

Answer: D

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89. The set of all values of a for which the functioln $f(x) = (a^2 - 3a + 2)(\cos^2 x/4 - \sin^2 x/4) + (a-1)x + \sin 1$ does not possess critical points is

A. $[1, \infty]$

B. $(0, 1) \cup (1, 4)$

C. $(-2, 4)$

D. $(1, 3) \cup (3, 5)$

Answer: B

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90. The minimum value of $(x - \alpha)(x - \beta)$ is

A. 0

B. $\alpha\beta$

C. $\frac{1}{4}(\alpha - \beta)^2$

D. $-\frac{1}{4}(\alpha - \beta)^2$

Answer: D

Watch Video Solution

91. The minimum values of $x^3 - 9x^2 + 24x - 12$ is

A. 1

B. 2

C. -8

D. 4

Answer: D

Watch Video Solution

92. If $x > 0$ the minimum value of x^x is

A. e^{-1}

B. $e^{1/e}$

C. $e^{-1/e}$

D. e

Answer: C

Watch Video Solution

93. The maximum value of $\frac{x}{1+x^2}$ is

A. $1/2$

B. 2

C. $-1/2$

D. none

Answer: C

Watch Video Solution

94. The absolute maximum of $y = x^3 - 3x + 2 \text{in} 0 \leq x \leq 2$ is

A. 4

B. 6

C. 2

D. 0

Answer: A

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95. The maximum value of $f(x) = 2x^3 - 21x^2 + 36x + 20$, in the interval $0 \leq x \leq 2$ is

A. 37

B. 44

C. 32

D. 30

Answer: A

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96. If m,n are positive integers, maximum value of $x^m(a-x)^n \text{in}(0, a)$ is

A. $m^m(a-m)^n$

B. $m^m n^n$

C. $\frac{m^m n^n a^{m+n}}{(m+n)^{m+n}}$

D. none

Answer: C

View Text Solution

97. If n is positive integer then greatest value of $x(a-x)^n$ on (0,a) is

A. 0

B. $(2a)^{n+1}$

C. a^n

D. $\frac{a(an)^n}{(n+1)^{n+1}}$

Answer: D

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98. If $A > 0, b > 0$ and $A + B = \pi/3$, then the maximum value of tan A tan B is

A. $1/\sqrt{3}$

B. $1/3$

C. 3

D. $\sqrt{3}$

Answer: B

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99. If $x > 0$, the maximum value of $\frac{\log x}{x}$ is

A. e

B. 2e

C. $1/2e$

D. $1/e$

Answer: D

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100. The maximum value of x^{-x} is

A. e^{e}

B. e^{-e}

C. $e^{-1/e}$

D. $e^{1/e}$

Answer: D

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101. The maximum value of $x^3 - 3x$ in [0,2] is

A. -2

B. 0

C. 2

D. 1

Answer: C

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102. The maximum value of (x-1)(x-2) (x-3)is

A. $\frac{2}{3\sqrt{3}}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{2}{3}$

D. $\frac{1}{\sqrt{3}}$

Answer: A

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103. The maximum value of $x^4 + 3x^3 - 2x^2 - 9x + 6$ is

A. 11

B. $3/8$

C. 3

D. 12

Answer: A

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104. The maximum value of $\frac{x}{1+x^2}$ is

A. $1/2$

B. 2

C. $-e$

D. none

Answer: A

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105. Find the least and the greatest value of $2\sin x+\sin 2x$ over $[0, 2\pi]$.

A. $3\sqrt{3}$

B. 3

C. $\frac{3\sqrt{3}}{2}$

D. 2

Answer: C

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106. Maximum value of $y = \sec x \text{in}(\pi/2, 3\pi/2)$ is

A. $-\sqrt{2}$

B. $\sqrt{2}$

C. 1

D. -1

Answer: D

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107. The maximum value of $(\sin x)^{\sin x}$ is

A. $7/3$

B. 7

C. $\pi/2$

D. 1

Answer: D

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108. The maximum value of $y = \sin^3 x \cos x \text{at} \pi / 3$ is

A. $3\sqrt{3}$

B. 3

C. $\frac{3\sqrt{3}}{16}$

D. 16

Answer: C

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109. The maximum value of a sin x+b cos x is

A. $\frac{\tan^{-1} a}{b}$

B. $\frac{a}{b}$

C. $\sqrt{a^2 + b^2}$

D. none

Answer: C

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110. The greatest value of $f(x) = 2x^2 + 2/x^2$ for $-2 \le x < 0, 0 < x \le 2$ and $f(0) = 1$ is

A. $17/2$

B. 1

C. 0

D. none

Answer: A

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111. The least value of $y = \frac{a^2}{x} + \frac{b^2}{1-x}$ on (0,1) is

A. 0

B. 1

C. (a+b)

D. $(a+b)^2$

Answer: D

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112. If $y = \sum_{i=1}^{n} (x - x_i)^2, x_i$ are constants, then y has minimum value at x=

A. n

B. $\sum x_i$

C. $\frac{\sum x_i}{n}$

D. none

Answer: C

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113. x and y are two + ve numbers sucbs that xy=1 Then the minimum value of x+y is

A. 2

B. $\sqrt{2}$

C. 3

D. $\sqrt{3}$

Answer: A

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114. If x,y = 12 then the minimum value of $x^2 + y^2$ is

A. 72

B. 144

C. 48

D. 36

Answer: A

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115. The greatest value of $\sin^3 x + \cos^3 x$ in $\left[0, \frac{\pi}{2}\right]$ is

A. 1

B. -1

C. 2

D. -2

Answer: A

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116. The greatest value of xe^{-x} is

A. $1/e$

B. -1

C. 2

D. -2

Answer: A

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117. The absolute minimum of y= c cosh (x/c) is

A. $1/c$

B. $c/2$

C. c

D. 2c

Answer: C

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118. If $a > b$, maximum value of a $\sin^2 x + b\cos^2 x$ is

A. a

B. b

C. a+b

D. none

Answer: A

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119. The minimum value of $27\tan^2\theta + 3\cot^2\theta$ is

A. 15

B. 18

C. 24

D. 30

Answer: B

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120. The minimum value of $a^2 \sec^2 \theta + b^2 \cos ec^2 \theta$ is

A. $a^2 - b^2$

B. $a^2 + b^2$

C. $(a - b)^2$

D. $(a + b)^2$

Answer: D

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121. The minimum value of $64 \sec \theta + 27 \cos ec\theta$ where θ lies in $(0, \pi / 2)$ is

A. 125

B. 136

C. 142

D. 115

Answer: A

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122. The minimum value of $\sqrt{(e^{x2}) - 1}$ is

A. 0

B. e

C. $1/e$

D. e^{e2}

Answer: A

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123. The minimum value of px+qy when xy= r^2 is

A. $2r\sqrt{pq}$

B. $2pq\sqrt{r}$

C. $-2r\sqrt{pq}$

D. none

Answer: A

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124. If $f(x) = x - \frac{k}{x}$ has a maximum value at x=-2 , then k=

A. -1

B. -2

C. -3

D. -4

Answer: D

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125. If the function $f(x) = x^2 + \alpha / x$ has a local minimum at x=2 , then the value of α is

A. 8

B. 18

C. 16

D. none

Answer: C

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126. The constant c of Lagrange's mean value theorem for $f(x) = 2\sin x + \sin 2x \text{in}[0, \pi]$ is

A. $\dfrac{-3\sqrt{3}}{2}$

B. 3

C. $\frac{3\sqrt{3}}{2}$

D. 2

Answer: A

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127. The minimum value of $(\sin x)^{\sin x}$ is

A. $e^{-1/e}$

B. 1

C. $\pi/2$

D. $1/e$

Answer: A

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128. If x is real, then the minimum value of $y = \frac{x^2 - x + 1}{x^2 + x + 1}$ is

A. 1

B. 3

C. $1/3$

D. none

Answer: B

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129. if x is real , the maximum value of $\frac{3x^2 + 9x + 17}{3x^2 + 9x + 7}$ is

A. 1

B. $17/7$

C. $1/4$

D. 41

Answer: D

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130. If x,y are strictly positive such that x+y=1 then the minimum value of xlogx+ylogy is

A. log 2

B. $-\log 2$

C. 2 log 2

D. 0

Answer: B

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131. If $l^2 + m^2 = 1$ then the max value of l+m is

A. 1

B. $\sqrt{2}$

C. $1/\sqrt{2}$

D. 2

Answer: B

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132. If x is real and $\frac{a\sin x + b\cos x}{c\sin x + d\cos x}$ has neither maximum nor minimum then

A. $a/d = c/b$

B. $a/b = d/c$

C. $a/c = b/d$

D. $a/c \ne b/d$

Answer: D

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133. The greatest value of the function $f(x) = \sin 2x - x$ on $[-\pi/2, \pi/2]$ is

A. $\frac{\sqrt{3}}{2} - \frac{\pi}{6}$

B. $\frac{\sqrt{3}}{2} + \frac{\pi}{6}$

C. $-\frac{\sqrt{3}}{2} + \frac{\pi}{3}$

D. $\frac{1}{2} - \frac{\pi}{3}$

Answer: A

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134. The least value of $f(x) = \sin 2x - x$ on $[-\pi/2, \pi/2]$ is

A. $\frac{\sqrt{3}}{2} - \frac{\pi}{6}$

B. $\frac{\sqrt{3}}{2} + \frac{\pi}{6}$

C. $\frac{\pi}{6} - \frac{\sqrt{3}}{2}$

D. $\frac{1}{2} - \frac{\pi}{6}$

Answer: C

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135. The difference between the greatest and least value of the function $f(x) = \sin 2x - x$ on $[-\pi/2, \pi/2]$ is

A. $\dfrac{\sqrt{3}+\sqrt{2}}{2}$

B. $\dfrac{\sqrt{3}+\sqrt{2}}{2}+\dfrac{\pi}{6}$

C. $\sqrt{3}-\dfrac{\pi}{3}$

D. $\dfrac{\sqrt{3}+\sqrt{2}}{2}-\dfrac{\pi}{3}$

Answer: C

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136. For $a > 0$, if the function $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$ attains its maximum value at p and minimum value at q such that $p^2 - q$ then $a =$

A. 3

B. 1

C. 2

D. $1/2$

Answer: C

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137. If ma and M respectively denote the minimum and maximum of $f(x) = (x - 1)^2 + 3$ for $x \in [-3, 1]$ then the ordered pair (m,M)=

A. $(-3, 19)$

B. $(3, 19)$

C. $(-19, 3)$

D. $(-19, -3)$

Answer: B

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138. Let $f: R \rightarrow R$ be defined, by $\begin{cases} k-2x & \text{if} \quad x \leq -1 \\ 2x+3 & \text{if} \quad x > -1 \end{cases}$

If f has a local minimum at x=-1 , then a possible value of k is

A. 1

B. 0

C. $-\frac{1}{2}$

D. -1

Answer: D

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139. p and q are distinct prime numbers and if the equation $x^2 - px + q = 0$ has positive integer as its roots then the roots the roots of the equation are

A. The cubic has minima at $-\frac{\sqrt{p}}{3}$ and maxima at $\sqrt{\frac{p}{3}}$

B. The cubic has minima at both $\frac{\sqrt{p}}{3}$ and $-\sqrt{\frac{p}{3}}$

C. The cubic has maxima at both $\sqrt{\frac{p}{3}}$ and $-\sqrt{\frac{p}{3}}$

D. The cubic has minima at $\sqrt{\frac{p}{3}}$ and maxima at $-\sqrt{\frac{p}{3}}$

Answer: D

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140. Given $P(x) = x^4 + ax^3 + bx^2 + cx + d$ such that x=0 is the only real root of $P'(x) = \; = 0$. If $P(-1) < P(1)$, then in the interval [-1,1]

A. P(-1) is not minimum but P(1) is the maximum of P

B. P(-1) is the minimum but P(1) is not the maximum of P

C. neither P(-1) is the minimum and P(1) is the maximum of P

D. P(-1) is the minimum and P(1) is the maximum of P

Answer: A

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141. A curve passes through the point (2,0) and the lope of the tangent at any point is $x^2 - 2x$ for all values of x. The point of maximum or minimum of the curveis

A. $(0, 2/3)$

B. $(0, 4/3)$

C. $(0, 1/3)$

D. $0, 5/3)$

Answer: B

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142. The point on the curve $y = \frac{x}{1+x^2}$ where the tangent to the curve has the greatest slope is

A. (0,0)

B. (1,1)

C. (1,0)

D. (2,3)

Answer: A

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143. The curve $y = ax^2 + bx$ has minimum at (2,-12) on it. Then (a,b) =

A. $(3, -12)$

B. $(-3, 12)$

C. $(-3, -12)$

D. $(3, 12)$

Answer: A

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144. If f(x) = a/x +bx has minimum at (2,1) then (a,b) =

A. $(1, 1/4)$

B. $(1/4, 1)$

C. $(1, 4)$

D. $(2, 1)$

Answer: A

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145. If $y=\frac{ax+b}{(x-1)(x-4)}$ has a maximum value at the point (2,-1) then

A. a=10 ,b=20

B. a=1,b=0

C. a=5,b=5

D. none

Answer: B

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146. If a quadratic function in x has the value 9 when x=1 and has maximum value 10 when x=2 then the function is

A. $-x^2+4x+6$

B. $x+4x-x^2$

C. $8+4x-x^2$

D. none

Answer: A

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147. A cubic function of x has maximum 10 and minimum -5/2, when x = -3 and x = 2 respectively. Find the function.

A. $\frac{1}{5}x^3+\frac{3}{10}x^2=\frac{18}{5}x+\frac{19}{10}$

B. $\frac{1}{15}x^3 + \frac{3}{10}x^2 - \frac{18}{5}x + \frac{16}{100}$

C. $ax^2 + bx + c = 0$

D. none

Answer: A

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148. The real number x when added to its inverse gives the minimum value of the sum at x=

A. 2

B. 1

C. -1

D. -2

Answer: B

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149. If the product of two positive numbers is 400 then the minimum value of their sum is

A. 8

B. 12

C. 32

D. 40

Answer: D

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150. The sum of two positive numbers is 12. The numbers so that the sum of the squares is minimum are

A. 6,6

B. 15,38

C. 24,24

D. 38,50

Answer: A

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151. The difference of two positive numbers is 10 . If the square of the greater exceeds twice the square of the smaller by maximum value then they are

A. 15,5

B. 20,10

C. 30,20

D. none

Answer: B

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152. The sum of three numbers is 30 . The first plus three times the second plus four times the third add up to 80. the numbers so that the product of all three is as large as possible are

A. 12,10,10

B. 10,10,10

C. 12,12,12

D. 10,12,12

Answer: B

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153. Divide 64 into two parts such that the sum of the cubes of two parts is minimum. The parts are

A. 32,30

B. 32,32

C. 40,,42

D. 42,42

Answer: B

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154. The maximum value of xy subject to x+y =7 is

A. 12

B. 10

C. 49/4

D. 55/4

Answer: C

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155. The sum of two numbers is 20 . If the product of the square of one number and cube of the other is maximum , then the numbers are

A. 10,10

B. 11,9

C. 8,12

D. 14,6

Answer: C

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156. The ratio of the two parts of a number 'a' such that the product of the p^{th} power of one and q^{th} power of the other is maximum is

A. $P^2 : q^2$

B. $p:q$

C. $p:p+q$

D. $q:p+q$

Answer: B

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157. If x, y, k, m, n are positive and x + y = k, then find the maximum value of $x^m y^n$.

A. $\dfrac{k^{m+n}m^m n^n}{(m+n)^{m+n}}$

B. $(m+n)^n$

C. $k^{m+nn}n^m$

D. none

Answer: A

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158. The difference of a number and its square is maximum, then the number is

A. $1/2$

B. 2

C. 1

D. 0

Answer: A

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159. If α, β are the roots of the quadratic equation $x^2 - (a-2)x - (a+1) = 0$, where a is a variable, then the least value of $\alpha^2 + \beta^2$ is

A. 3

B. 5

C. 7

D. none

Answer: B

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160. The value of a so that the sum of the squares of roots of the equation $x^2 - (a-2)x - a + 1 = 0$ assume the least value is

A. 2

B. 0

C. 3

D. 1

Answer: D

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161. The function $f(x) = a\sin x + \frac{1}{3}\sin 3x$ has maximum value at $x = \frac{\pi}{3}$. The value of a is

A. 3

B. $1/3$

C. 2

D. $1/2$

Answer: C

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162. The focal distance of the point (4,2) on the parabola $x^2 = 8y$ is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: B

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163. The equation of the normal to the curve $x^2 = 4y$ at $(2, 1)$

is

A. (4,4)

B. (1,2)

C. (9,6)

D. (4,5)

Answer: B

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164. The point on the curve $y = x^2$ which is nearest to (3,0) is

A. $(1, -1)$

B. $(-1, 1)$

C. $(-1, -1)$

D. (1,1)

Answer: D

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165. The point on the curve $x^2 = 2y$ which is closest to the point (0,5) is

A. $(\pm 2\sqrt{2}, 3)$

B. $(\pm 2\sqrt{2}, 4)$

C. $(\pm \sqrt{2}, 3)$

D. $(\pm\sqrt{3}, 4)$

Answer: B

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166. The minimum distance from the origin to a point on the curve $x^{2/3} + y^{2/3} = a^{2/3} (a > 0)$ is

A. a

B. a/2

C. $a/\sqrt{8}$

D. $a^{2/3}$

Answer: B

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167. The shortest distance from (-6,0) to $x^2 - y^2 + 16 = 0$ is

A. $3\sqrt{5}$

B. $\sqrt{34}$

C. 5

D. none

Answer: B

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168. The points on $y = x^2 + 7x + 2$ which is closest to the line y=3x-3 is

A. (-2,-4)

B. (-2,-8)

C. (2,8)

D. (2,4)

Answer: B

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169. The point on the curve $y = x^2 + 4x + 3$ which is closest to the line y=3x+2 is

A. $\left(\frac{1}{2}, \frac{5}{4}\right)$

B. $\left(-\frac{1}{2}, \frac{5}{4}\right)$

C. $\left(2, -\frac{5}{3}\right)$

D. $\left(2, \frac{5}{3}\right)$

Answer: B

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170. The shortest distance between the line y-x =1 and the curve $x = y^2$ is

A. $\frac{2\sqrt{3}}{8}$

B. $\frac{3\sqrt{2}}{5}$

C. $\frac{\sqrt{3}}{4}$

D. $\frac{3\sqrt{2}}{8}$

Answer: D

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171. The longest distance of the point (a,0) from the curve $2x^2 + y^2 = 2x$ is

A. 1+a

B. |1-a|

C. $\sqrt{1 - 2a + 2a^2}$

D. $\sqrt{1 - 2a + 3a^2}$

Answer: C

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172. Point P is (-2,-3) and point Q is (3,7) . The point A on the axis for which PA+AQ is least is (-,0) . Then A =

A. (-1,/2,0)

B. (1/2,0)

C. (1,2)

D. (-1,0)

Answer: A

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173. A line is drawn through the point (1,2) to meet the coordinate axes at P and Q such that it forms a triangle OPQ, where O is the origin . If the area of the triangle OPQ is least, then the slope of the line PQ is

A. -2

B. $-1/2$

C. $-1/4$

D. -4

Answer: A

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174. If the perimeter of a maximum rectangle is constant , then that rectangle

A. is a square

B. in not a square

C. may or may not be a square

D. none

Answer: A

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175. The maximum area of the rectangle that can be inscribed in a circle of radius r is

A. is a square

B. is not a square

C. may or may not be a square

D. none

Answer: A

Watch Video Solution

176. The triangle of maximum area that can be inscribed in a circle is

A. is a square

B. is not a square

C. may or may not be a square

D. none

Answer: A

Watch Video Solution

177. The maximum area of the rectangle that can be inscribed in a circle of radius r is

A. r^2

B. r^3

C. $r^2 / 4$

D. $2r^2$

Answer: D

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178. The sides of the greatest rectangle that can be inscribed in $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are

A. $a\sqrt{2}, b\sqrt{2}$

B. $\sqrt{a}, \sqrt{b}$

C. a,b

D. none

Answer: A

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179. Area of the largest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

A. πab

B. ab

C. 2 ab

D. 1/2 ab

Answer: C

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180. The sides of a rectangle , with maximum perimeter, inscribed in a semicircle of radius R are

A. $\frac{R}{2}, \frac{R}{2}$

B. $\frac{4R}{\sqrt{5}}, \frac{R}{\sqrt{5}}$

C. $\frac{3R}{\sqrt{5}}, \frac{2R}{\sqrt{5}}$

D. none

Answer: B

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181. A wire of length l is cut into two parts which are bent respectively in the form of a square and a circle. What are the lengths of pieces of wire so that the sum of areas is least ?

A. $\dfrac{a}{\pi+4}$

B. $\dfrac{a^2}{4(\pi+4)}$

C. $\dfrac{a^2}{\pi+4}$

D. $\dfrac{100}{\pi+4}$

Answer: B

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182. A wire of length 20cm is cut into two parts which are bent in the form of a square and a circle, then the least value of the sum of areas so formed is

A. $\dfrac{400}{\pi+4}$

B. $\dfrac{20}{\pi+4}$

C. $\dfrac{5}{\pi + 4}$

D. $\dfrac{100}{\pi + 4}$

Answer: D

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183. A window is in the shape of a rectangle surmounted by a semi-circle. If the perimeter of the window be 20 feet then find the maximum area.

A. $\dfrac{k^2}{\pi + 4}$ sq. unit

B. $\dfrac{k}{\pi + 4}$ sq. unit

C. $\dfrac{k^2}{2(\pi + 4)}$ sq. unit

D. $\dfrac{k}{2(\pi + 4)}$ sq.unit

Answer: C

Watch Video Solution

184. A window is in the shape of a rectangle surmounted by a semi-circle. If the perimeter of the window be 20 feet then find the maximum area.

A. $\frac{200}{\pi+4}$sq .ft.

B. 200 sq. ft

C. $\frac{\pi}{200}$sq. ft.

D. none

Answer: A

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185. A line segment of length 10 cm is diveded into two parts and a rectangle is formed with these as adjacent sides, then the dimensions of the rectangle in order that its area is maximum is

A. 4,6

B. 5,5

C. 2,8

D. none

Answer: B

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186. A (0,a) ,B(0,b) be fixed points , P(x,0) a variable point. The angle $\angle APB$ is maximum if

A. $x^2 = ab$

B. x=ba

C. $2x^2 = 2ab$

D. none

Answer: A

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187. A line segment of length 8cm is divided into two parts AP and PB by a point P. If $AP^2 + PB^2$ is minimum then AP=

A. P is the midpoint of AB

B. P is a point of trisection of AB

C. P divides AB in the ratio 1:3

D. none

Answer: A

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188. ABCD is rectangle in which AB= 9cm , BC =6 cm . P is a point in CD such that PC=x. If $AP^2 + PB^2$ is minimum then x=

A. 2/9 cm

B. 9/2 cm

C. 9 cm

D. 2 cm

Answer: B

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189. The triangle of maximum area that can be inscribed in a circle is

A. an isosceles

B. right angled

C. an equilateral

D. none

Answer: C

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190. The maximum value of the area of the triangle with vertices (a,0) ,(a $\cos\theta, b\sin\theta$) , $(a\cos\theta, -b\sin\theta)$ is

A. $\frac{3\sqrt{3ab}}{4}$

B. $3\sqrt{ab}$

C. $\frac{\sqrt{3ab}}{4}$

D. $3\sqrt{3ab}$

Answer: A

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191. Find the triangle of the greatest area among the right triangles of a given perimeter p.

A. $\frac{p^2}{2}$

B. $\frac{p^2}{2\left(2+\sqrt{2}\right)^2}$

C. $\sqrt{2^2}$

D. $2p^2$

Answer: B

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192. The maximum area of triangle formed by a tangent line to the curve $x^{2/3}+y^{2/3}$ =1 and the coordinates axes is

A. 1/4 sq . Units

B. 1/2 sq. units

C. 1 sq. units

D. none

Answer: A

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193. The sum of the hypotenuse and a side of a right angled triangle is constant . If the area of the triangle is maximum then the angle between the hypotenuse and the given side is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. π

Answer: B

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194. Two sides of a triangle is given . If the area of a triangle is maximum, then the angle between the two sides is

A. $\pi/2$

B. $\pi/6$

C. π

D. none

Answer: A

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195. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides having fence are of same length x. The maximum area enclosed by the park is

A. $\frac{1}{2}x^2$

B. πx^2

C. $\frac{3}{2}x^2$

D. $\frac{\sqrt{x^3}}{8}$

Answer: A

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196. The point P in the first quadrant of the ellipse $x^2/8 + y^2/18 = 1$ so that the area of the triangle formed by the tangent at P and the coordinate axes is least

A. (2,3)

B. $(\sqrt{8}, 0)$

C. $(\sqrt{18}, 0)$

D. none

Answer: A

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197. A straight line through the point (3,4) in the first quadrant meets the axes at A and B .

The minimum area of the triangle OAB is

A. 24 sq. unit

B. 42 sq. unit

C. 22 sq .unit

D. 12 sq. unit

Answer: A

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198. Through the point (2,3) ,a straight line is drawn making, positive intercept on the coordinate axes, . The area of the triangle thus formed is least when the ratio of the intercepts on the x and y axes is

A. $1:2$

B. $3:1$

C. $2:3$

D. none

Answer: C

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199. The perimeter of a sector is given. The area is maximum when the angle of the sector is

A. $\pi^{c} / 6$

B. $\pi^{c} / 4$

C. 4^{c}

D. 2^{c}

Answer: D

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200. If the perimeter of a sector of a circle is constant then find the angle of the sector, when its area is maximum.

A. $c^2 / 16 sq.\ cm$

B. $c^2 / 8 sq.\ cm$

C. $c^2 / 4 sq.\ cm$

D. none

Answer: A

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201. Twenty meters of wire is available to fence off a flower bed in the form of a sector. If the flower bed has the maximum surface then radius is

A. 10

B. $\frac{5}{2}$

C. 5

D. $15/2$

Answer: C

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202. A wire of length 20 cm can be bent in the form of a sector then its maximum area is

A. 15 sq. cm

B. 25 sq.cm

C. 5 sq. cm

D. none

Answer: B

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203. A box is made from a piece of metal sheet 24 cms square by cutting equal small squares from each corner and traning up the edges If the volume of the box is maximum then then the dimensions of the box are

A. 2,8,8

B. 2,6,8

C. 4,6,8

D. 2,4,4

Answer: A

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204. An open top box of maximum possible volume from a square piece of tin of side 'a' is to be made by cutting equal squares out of the corners and then folding up the tin to form the sides. The length of a side of square cut out is

A. $a/6$

B. $a/4$

C. $a/3$

D. $a/2$

Answer: A

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205. From a rectangular sheet of dimensions $30cm \times 80cm$, four squares of sides x cm are removed at the corners, and the sides are then turned up so as to form an open rectangular box. What is the value of x, so that the volume of the box is the greatest?

A. 20/3

B. $10/3$

C. $15/2$

D. 5

Answer: A

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206. The strength of a beam varies as the product of its breadth b and square of its depth d. A beam cut of a circular log of radius r would be strong when

A. $b = d = \frac{r}{2}$

B. $b^2 = \frac{r}{2}\sqrt{2} = d$

C. $d = \sqrt{2}b = \sqrt{2/3} \cdot 2r$

D. $d = \sqrt{3}b = \sqrt{3/2} \cdot 2r$

Answer: C

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207. The height of the cylinder of maximum volume which can be inscribed in a sphere of radius 'r' is

A. $\sqrt{3}r$

B. $r / \sqrt{3}$

C. $2r / \sqrt{3}$

D. $r / r\sqrt{3}$

Answer: C

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208. The radius of right circular cylinder of maximum volume which can be inscribed in a sphere of radius r is

A. r

B. $r / 2$

C. $\sqrt{2 / 3r}$

D. $\sqrt{3/2r}$

Answer: C

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209. The maximum volume of the cylinder which can be inscribed in a sphere of radius a

A. $\frac{4\pi a^3}{3\sqrt{3}}$ cubic unit

B. $4\pi a^3$ cubic unit

C. $\frac{4\pi a^3}{\sqrt{3}}$ cubic unit

D. none

Answer: A

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210. The volume of the greatest cylinder which can be inscribed in a cone of height h and semi- vertical angle α is

A. $\frac{4\pi h^3}{27}\tan^2\alpha$

B. $4\pi h^2\tan^2\alpha$

C. $\frac{4\pi h^3}{9}\tan^2\alpha$

D. none

Answer: A

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211. The height and the radius of the base of a cylinder of maximum volume, given the sum of the height and the diameter of the base of the cylinder is 3 unit are

A. 2,2

B. 1,1

C. 10,10

D. none

Answer: B

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212. The dimensions of the greatest cylinder that can be inscribed in a sphere of radius a are

A. $\frac{2a}{\sqrt{3}}, \frac{a\sqrt{2}}{\sqrt{3}}$

B. $\frac{2a}{3}, \frac{a}{3}$

C. $\frac{a}{\sqrt{3}}, \frac{2a}{\sqrt{3}}$

D. none

Answer: A

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213. Show that when the curved surface of a is right circular cylinder inscribed in a sphere of radius R is maximum , then the height of the cylinder is $\sqrt{2R}$.

A. $\sqrt{R}$

B. $\sqrt{10}R$

C. $\sqrt{2}R$

D. R

Answer: C

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214. A cylindrical, gas container is closed at the top and open bottom. If the iron plate of the top is 5/4 times as thich as the plate forming the cylindrical sides, the ratio of the radius to the height of the cylinder using minimum material for the same cpacity is

A. 4

B. 5

C. $4/5$

D. 20

Answer: C

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215. The height of the cylinder of maximum volume which can be inscribed in a sphere of radius 'r' is

A. $\frac{R}{3}$

B. $\frac{2R}{3}$

C. $\frac{4R}{3}$

D. $\frac{4R}{\sqrt{3}}$

Answer: C

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216. The height of the cone of maximum volume which can be inscribed in a sphere of radius 6 is

A. 8

B. 4

C. 2

D. 24

Answer: A

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217. The semivertical angle of a cone of maximum volume and of given total surface area is

A. $\sin^{-1}\sqrt{2}$

B. $\sin^{-1} 1/3$

C. $\tan^{-1} \sqrt{2}$

D. $\tan^{-1} 1/3$

Answer: B

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218. A conical tent of given capacity will require the least amount of canvas when the height is ...... times the radius of the tent

A. 1

B. 2

C. $\sqrt{3}$

D. $\sqrt{2}$

Answer: D

View Text Solution

219. The semivertical angle of the cone of maximum volume and of given slant height is

A. $\tan^{-1}(\sqrt{2})$

B. $\cos^{-1}(\sqrt{2})$

C. $\sin^{-1}(\sqrt{2})$

D. none

Answer: A

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220. If h is the height of the maximum cone inscribed in a sphere of radius r then h : r=

A. $4:3$

B. $3:4$

C. $2:1$

D. $1:1$

Answer: A

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221. The maximum volume of the right circular cone that can be inscribed in a sphere of radius R

A. $\frac{32}{27}\pi R^3$ cubic units

B. $\frac{32}{81}\pi R^3$ cubic unit

C. $85\pi R^3$ cubic unit

D. none

Answer: B

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EXERCISE 2 SET-1 (SPECIAL TYPE QUESTIONS)

1. If $f(x) = x^2 + 3x, x = 10, \delta x = 0.01$ then

I: $\delta f = 0 \cdot 2301$

II : $df = 0 \cdot 23$

III : relative error in x is 1

A. only I, III are true

B. only II,III are true

C. only I,II are true

D. I,II,III are true

Answer: C

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2. There is an error of $0 \cdot 02$ cm is is made in measuring the radius 10 cm of a circle. Then

I: Appoximate error in area is $0 \cdot 5$ sq. cm

II: Approximate percentage error in area is $0 \cdot 4$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: B

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3. Semivertical angle of a cone is 45° and height is $30 \cdot 05$ cm

I : Error in volume is 45π cubic cm . Approximately

II : Percentage error in volume is 1/2

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: D

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4. Equation of the tangent to the curve $y = 2x^3 \_ 6x^2 - 9$ at the point where the curve crosses the y -axis is

A. only I is true

B. only II is true

C. I and II are true

D. neither I nor II true

Answer: A

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5. Equation of the tangent to the curve $y = 2x^3 \_ 6x^2 - 9$ at the point where the curve crosses the y -axis is

A. only I is true

B. only II is true

C. I and II are true

D. neither I nor II true

Answer: B

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6. The angle between the curves $y = x, y = 1/x$ at (1, 1) is

A. only I is true

B. only II is true

C. I and II are true

D. neither I nor II true

Answer: C

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7. Observe the following statements for the curve $y^2 = 4ax$.

I : The length of the subnormal at any point is a constant.

II : the length of the sub- tangent at any point is twice the abscissa of the point of contact

III : Area of triangle formed by tangent normal and x-axis at any point is a constant.

A. only I,II are true

B. only II,III are true

C. only I,III are true

D. I,II,III are true

Answer: A

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8. Observe the following statements for the curve x=a (cos t + log tan 1/2), y=a sin t

I : Slope of the tangent at any point is tan t

II : Length of the tangent at any point is constant

III : Length of the sub-tangent at any point is | a cos t|

A. only I,II are true

B. only II,III are true

C. only I,III are true

D. I,II,III are true

Answer: D

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9. If displacement s, time t are related by $s = \sqrt{t}$ then

I : Acceleration is proportional to velocity.

II : Velocity is inversly proportional to displacement.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: B

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10. I : A particle is projected vertically upward its height h at time t is given by $h = 60t - 16t^2$. The velocity at which it hits the ground is 60 units /sec.

II : A stone is thrown up vertically and the height h reached in time t given by $h = 80t - 16t^2$. The stone reaches the maximum height in 5/2 secs.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: C

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11. A man of height 180 cm walks at a uniform rate of 12 km/hr away from the lamp post of height 450 cm . Then

I : Rate at which the length of shadow increases is 8 km/hr

II : Rate at which the tip of shadow is moving is 20 km /hr

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: C

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12. I : The function log (log x) increases in $(1, \infty)$.

II : The function x^x is decreasing in (0,1/e)`.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: C

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13. I : The function $f(x) = xe^{-x}$ has maximum at x=e .

II : The function f(x) = sin x(1 + cosx) has maximum at $x = \pi / 3$.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: B

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14. The maximum value of $x^4 + 3x^3 - 2x^2 - 9x + 6$ is

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

Answer: B

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EXERCISE 2 SET-2 (SPECIAL TYPE QUESTIONS)

1. If $f(x) = 2x^2 + 3x - 5, x = 3, \delta x = 0.1$ then $\delta f = A$

(2) If $f(x) = x^2 + 4x, x = 2, \delta x = 0.1$ then $\delta f = B$

(3) If $f(x) = x^2 + 3x, x = 3, \delta x = 0.1$ then $\delta f = C$

The ascending order of A, B C is

A. A,B,C

B. B,C,A

C. C,A,B

D. A,C,B

Answer: B

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2. IF an error of 0.01 cm is made while measuring the radius 2 cm of a circle, then the relative error in the circumference is

A. A,B,C

B. B,C,A

C. C,A,B

D. A,C,B

Answer: C

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3. Radius of a sphere is 2 cm and error in it is 1/10 cm then arrange the approximate values of the following in decending order

A) Error in diameter

B) Error in Circumference

C) Error in area

D) Relative error in radius

A. A,B,C,D

B. D,A,C,B

C. B,D,A,C

D. D,C,B,A

Answer: D

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4. If A,B,C,D are the length of tangents to the curves

1) $y = 4x^2$ at (-1,4)

2) $y = x^3 + 1$ at (1,2) 3) $y = \dfrac{x^3}{2-x}$ at (1,1)

4) $2x^2 + 3xy - 2y^2 = 8$ at (2,3) then the ascending order of A,B,C,D is

A. A,B,C,D

B. B,C,D,A

C. A,B,D,C

D. C,B,D,A

Answer: D

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5. If A,B,C,D are the length of normals to the curves $1) y = 4x^2$ at (-1,4)

2) $y = x^3 + 1$ at (1,2) 3) $y = \dfrac{x^3}{2-x}$ at (1,1)

4) $2x^2 + 3xy - 2y^2 = 8$ at (2,3) then the ascending order of A,B,C,D is

A. A,B,C,D

B. B,C,D,A

C. A,B,D,C

D. C,B,D,A

Answer: D

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6. If A,B,C,D are the lengths of subtangents to the curves 1) $\sqrt{x} + \sqrt{y} = 3$ at (4,1)

2) $x^2y^2 = 1$ at (-1,1)

3) $y = \frac{x+1}{x}$ at (1,2)

4) $x^2 + xy + y^2 = 7$ at (1,-3) then the descending order of A,B,C,D is

A. A,B,C,D

B. D,C,B,A

C. A,B,D,C

D. C,B,D,A

Answer: B

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7. The lengths of tangent, subtangent, normal and subs normal for the curve $y = x^2 + x - 1$ at (1, 1) are A, B, C and D respectively, then their increasing order is

A. B,D,A,C

B. B,A,C,D

C. A,B,C,D

D. B,A,D,C

Answer: D

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8. If A,B ,C are the maximum velocities of the particles moving according to the law

$s = 60t - 5t^3$, $s = 6t - \frac{1}{2}t^2$, $s = 10t - 7t^3$ respectively then the ascending order of A,B,C is

A. A,B,C

B. C,B,A

C. B,A,C

D. B,C,A

Answer: D

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9. If A,B,C are the maximum heights reched when three stones projected vertically upwards moves according to the law $s = 128t - 16t^2$, $s = 48t - 16t^2$, $s = 80t - 16t^2$ respectively then the descending order of A,B,C is

A. A,C,B

B. C,B,A

C. B,A,C

D. B,C,A

Answer: A

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10. If A,B,C are the minimum values of $2x^3 - 3x^2 - 12x + 5$, $x^3 - 9x^2 + 24x - 12$, $x^3 - 6x^2 + 9x + 1$ then the ascending order of A,B,C is

A. A,B,C

B. B,C,A

C. C,A,B

D. A,C,B

Answer: D

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11. The functions $y = x^4 - 6x^2 + 8x + 15$ has minimum at x=A ,y=x(x-1)(x-2) has maximum at x=B , $y = 2x^3 - 3x^2 - 12x + 5$ has minimum at x=C. The ascending order of A,B,C is

A. A,B,C

B. B,C,A

C. C,A,B

D. A,C,B

Answer: A

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EXERCISE 2 SET-3 (SPECIAL TYPE QUESTIONS)

1. Match the following

I.	The approximate value of $(2\cdot001)^4$	a	$0\cdot4983$
II.	The approximate value of $(1\cdot0002)^{3000}$	b	2.02
III.	The approximate value of $\sqrt{4\cdot08}$	c	$1\cdot6$
IV.	The approximate value of $\frac{1}{3\sqrt{8\cdot08}}$	d	$16\cdot032$

A. c,b,d,a

B. d,c,b,a

C. a,c,b,d

D. c,b,d,a

Answer: C

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2. Match the following

I.	The approximate value of $\sin(30^\circ 1^1)$	a	1.00058
II.	The approximate value of $\cos(61^\circ)$	b	1.0349
III.	The approximate value of $\tan(46^\circ)$	c	0.4849
IV.	The approximate value of $(45^\circ 1')$	d	0.50025

A. c,b,d,a

B. d,c,b,a

C. c,d,a,b

D. c,b,d,a

Answer: B

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3. If side of a cube is 10 cm and error in it is 0.05 cm then match the following

I.	Error in surface are of cube	a	15
II.	Percentage error in surface area	b	6
III.	Error in volume	c	1.5
IV.	Percentage error in volume	d	0.05
		e	1

A. b,d,e,a

B. a,c,c,d

C. a,c,b,e

D. b,e,a,c

Answer: D

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4. The slope of the tangent to the curve $y = 6 + x - x^2$ at (2,4) is

A. a,b,c,d

B. b,c,d,a

C. c,d,b,a

D. c,d,a,b

Answer: D

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5. Match the points on the curve $2y^2 = x + 1$ with the slope of normals at those points

I.	$(7, 2)$	a	$-4\sqrt{2}$
II.	$\left(0.1/\sqrt{2}\right)$	b	-8
III.	$(1, -1)$	c	4
IV.	$\left(3, \sqrt{2}\right)$	d	0
		e	$-2\sqrt{2}$

A. b,d,c,a

B. b,e,c,a

C. b,c,c,a

D. b,e,a,c

Answer: B

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6. Match the following

I. length of tangent at (1, 2) on the curve $y = x^3 + 1$ is — a) $2\sqrt{5}$

II. length of normal at (1, 2) on the curve $y = x^2 + 1$ is — b) 3

III. length of sub-tangent at any point on the curve $y = be^{x/a}$ is — c) $\frac{2\sqrt{10}}{3}$

IV. length of the normal at the point (1, 1) on the curve $y = x^3$ is — d) $\sqrt{5}$

e) $|a|$

A. a,c,b,d

B. c,b,e,a

C. c,a,d,b

D. c,a,e,b

Answer: D

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7. Match the following

I. Angle between the curves y^2 $4x, x^2$ $2y$ 3 at $(1\ 2)$	a) 90°
II. Angle between the curves $xy = 4, x^2 - y^2 = 15$ at $(-4, -1)$	b) 0°
III. Angle between the curves $y^2 = x, x^2 = y$ at $(1, 1)$	c) $Tan^{-1} 3$
IV. Angle between the curves $x^2 = 4y, x^2 + y^2 = 5$ at $(-2, 1)$	d) $Tan^{-1} (3/4)$

A. a,b,c,d

B. b,c,d,a

C. c,d,b,a

D. b,a,d,c

Answer: D

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8. The rate of change of radius of a circle is 1 cm / sec. Match the following

I. The rate of change of area when radius = 5 cm — a) 2π

II. The rate of change of area when radius = 3 cm — b) 6π

III. The rate of change of area when radius = 4 cm — c) 8π

IV. The rate of change of perimeter when radius = 3 cm — d) 10π

A. d,b,c,a

B. d,c,b,a

C. c,d,b,a

D. a,d,b,c

Answer: A

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9. Match the following

I. Rate of increase in area of equilateral triangle of side 15cm, when each side is increasing at the rate of 0·1 cm/s; is — a) 67·5 c.c/s

II. Rate of increase in area of square of side 15 cm and each side is increasing at the rate of 0·1 cm/s is — b) $3\sqrt{3}/2$ cm^2/s

III. Rate of increase in volume of the cube of side 15 cm and each side is increasing at the rate of 0·1 cm/s is — c) $6cm^2/s$

d) $3cm^2/s$

A. d,a,b

B. c,a,d

C. c,a,b

D. a,b,d

Answer: A

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10. Match the following

I. $f(x) = x^2 - 2x + 5$ is increasing in	a) $x > 1/e$
II. $f(x) = x^x$ decreases for	b) $(-\infty, -1) \cup (1, \infty)$
III. $f(x) = x + \frac{1}{x}$ is increasing in	c) $(1, \infty)$
IV. $f(x) = 9 - 6x - 2x^2 - x^3$ is decreasing for	d) $(-\infty, \infty)$
	e) $0 < x < 1/e$

A. b,a,e,c

B. c,e,d,b

C. c,e,d,b

D. d,a,c,b

Answer: C

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11. Match the following

Function	Maximum value
I. $\frac{\log x}{x}$	a) $e^{1/e}$
II. x^{-x}	b) $e^{-1/e}$
III. $a \sin^2 x + b \cos^2 x \ (a > b)$	c) $1/e$
IV. $(\sin x)^{\sin x}$	d) b
	e) a

A. a,b,d,e

B. c,d,b,a

C. d,b,e,a

D. c,a,c,b

Answer: D

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12. Match the following

I. If $l^2 + m^2 = 1$ then maximum value of $l + m$ is	a) $\sqrt{2}$
II. Minimum value of $x^3 - 9x^2 + 24x - 12$	b) 2
III. Least value of $f(x) = \sin 2x - x$ on $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$	c) 4
IV. $f(x) = \lvert x - 2 \rvert$ is least when $x =$	d) $\frac{\pi}{6} - \frac{\sqrt{3}}{2}$
	e) 0

A. a,c,d,b

B. a,c,d,b

C. a,b,c,d

D. c,a,d,e

Answer: A

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13. Match the following

I. The point on the curve $y^2 = 4x$ nearest to (2, 1) is — a) (1, 1)
II. The point on the curve $y = x^2$ nearest to (3, 0) is — b) (1, 2)
III. The point on $y = x^2 + 7x + 2$ nearest to $y = 3x - 3$ is — c) (−2, −8)
IV. The point on $y = x^2 + 4x + 3$ nearest to $y = 3x + 2$ is — d) (−1/2, 5/4)

A. a,b,c,d

B. b,d,a,c

C. b,a,c,d

D. d,c,b,a

Answer: C

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EXERCISE 2 SET-4 (SPECIAL TYPE QUESTIONS)

1. A : In triangle ABC if a,A and R are fixed then

$\Delta a \cdot \sec A + \Delta b \cdot \sec B + \Delta c \cdot \sec C = 0$

R : In any triangle , A+B+C = π and $so \Delta A + \Delta B + \Delta C = 0$

A. A,R are true and R is correct explanation of A

B. A,R are true of but R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: A

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2. A : if semivertical angle of a cone is 45° and height of the cone is 20.025 then approximate value of its volume is 10π cubic units.

R : If semivertical angle of a cone is α and height is h then volume of cone is $\frac{\pi}{3}h^{3}\tan^{2}\alpha$

A. A,R are true and R is correct explanation of A

B. A,R are true of but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D

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3. Assertion (A) : If semi vertical angle of a cone is 45° and height is 30.05 cm then approximate volume of cone is 9045.08 πc.c

Reason(R): When semi vertical angle is 45° approximate error in volume is $\delta v = \pi r^2 \delta h$

A. A,R are true and R is correct explanation of A

B. A,R are true of but R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: D

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4. A : The gradiant of the curve $y = x^3 - 3x^2 - 2x + 7$ at (1,3) is -5.

R : The gradiant of the curve $y = f(x) \text{at} P \text{is} \left(\frac{dy}{dx}\right)_p$

A. A and R are true and R is the correct explanation of A

B. A and R are true and R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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5. A : Area of triangle formed by tangent to the curve $xy = c^2$ with coordinates axes is $2c^2$ sq . Units.

R: Area of triangle formed by the line $\frac{x}{a}+\frac{y}{b}=1$ with coordinate axes is $\frac{1}{2}$ |ab| sq. units

A. A and R are true and R is the correct explanation of A

B. A and R are true and R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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6. The curves $y=x^3-3x^2-8x-4, y=3x^2+7x+4$ touch at the point (-1, 0). The equation of the common tangent is

A. A and R are true and R is the correct explanation of A

B. A and R are true and R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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7. A : The curve $y = x^2, 6y = 7 - x^3$ cut orthogonally at (1,1) .

R : Two curve cut each other orthogonally at their point of intersection P iff $m_1 m_2 = -1$ where m_1, m_2 are the gradiants of the two curves at P .

A. A and R are true and R is the correct explanation of A

B. A and R are true and R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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8. A :A particle moves along a line is given by $s=\frac{t^3}{3}-3t^2+8t+5$ .its direction changes only when t=2.4

R : The direction of a body changes only when sigh of velocity changes

A. A,R are true and R is correct explanation of A

B. A,R are true and R is correct explanation of A

C. A is true, R is false

D. A is false ,R is true

Answer: A

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9. A : The smallest value of $x^2 - 3x + 3$ in [-3,3/2] is 3/4

R: The smallest value of f(x) in [a,b] is equal to the local minimum of f(x)

A. Both A and R are true and R is correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true R is false

D. A is false but R is true

Answer: C

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10. A : The function $f(x) = 2x^3 - 3x^2 - 12x + 8$ has minimum value

R: For the above function $f'(2) = 0$ and $f''(2) > 0$

A. Both A and R are true and R is correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true R is false

D. A is false but R is true

Answer: A

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11. A : If x+y =12 then the minimum value of $x^2 + y^2$ is 72

R : If x+y=k then the maximum value of xy is k^2

A. Both A and R are true and R is correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true R is false

D. A is false but R is true

Answer: A

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12. Observe the following statements :

Asseration (A) : $f(x) = 2x^3 - 9x^2 + 12x - 3$ is increasing outside the interval (1,2)

Reason (R) : $f^1(x) < 0$ for $x \in (1, 2)$

Then which of the following is true

A. Both A and R are true, and R is not the correct reason for A

B. Both A and R are true and R is the correct reason for A

C. A is true but R is false

D. A is false but R is true

Answer: A

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13. The function $f(x) = xe^{-x}(x \in R)$ attains a maxium value at x= .....

A. Both (A) and (R) are true and (R) is the correct reason for (A) .

B. Both (A) and (R) are true, but (R) is not the correct reason for (A)

C. (A) is true , (R) is false

D. (A) is false, (R) is true

Answer: A

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14. Consider the functions, $f(x) = |x - 2| + |x - 5|, x \in R$

Statement-1 : $f'(4) = 0$ Statement-2 : f is continuous in [2, 5], differentiable in (2, 5) and $F(2) = F(5)$

A. Statement 1 is true , statement 2 is true, statement 2 is not a correct explanation for statement 1

B. statement 1 is true, statement 2 is false

C. statement 1 is false, statement 2 is true

D. statement 1 is true , statement 2 is true, statement 2 is a correct explanation for statement 1

Answer: A

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15. Let $a, b \in R$ be such that the function f given by f(x)= ln $|x| + bx^2 + ax, x \neq 0$ has extreme values at $x = -1$ and $x = 2$

Statemet-I : f has local maximum at $x = -1$ and $x = 2$.

Statement- II: $a = \frac{1}{2}, b = \frac{-1}{4}$

A. Statement 1 is true , statement 2 is true, statement 2 is not a correct explanation for statement 2

B. statement 1 is true, statement 2 is false

C. statement 1 is false, statement 2 is true

D. statement 1 is true , statement 2 is true, statement 2 is a correct explanation for statement 2

Answer: D

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