MATHS

BOOKS - HIMALAYA MATHS (KANNADA ENGLISH)

APPLICATION OF DIFFERENTIATION

Question Bank

1. The tangent to the curve $x^2 = 2y$ at (1,1/2) makes an angle with the x-axis

A. 30^o

B. 0^0

C. 45^o

D. 60^0

Answer: C

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2. The point on the curve $y = x^2$, where slope of the tangent is equal to the x-coordinate of the point is :

A. (2,4)

B. (0,0)

C. $\left(-\frac{1}{2}, \frac{1}{4}\right)$

D. (-2,2)

Answer: B

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3. The curves $\frac{x^2}{a^2} + \frac{y^2}{4} = 1$ and $y^3 = 16x$ intersect each other orthogonally, then a^2 =

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

B. $\frac{3}{4}$

C. $\frac{4}{3}$

D. 2

Answer: C

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4. The tangent to the curve $y = e^{2x}$ at the point (0,1) meets the x -axis at

A. (0,0)

B. (2,0)

C. $\left(-\frac{1}{2}, 0\right)$

D. $\left(\frac{1}{2}, 0\right)$

Answer: C

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5. $x = a\cos\theta, y = b\sin\theta.$

A. 0

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

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

D. π

Answer: C

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6. 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 the value of $p^{-\frac{4}{3}} + q^{-\frac{4}{3}} =$

A. $a^{-\frac{4}{3}}$

B. $a^{-\frac{1}{2}}$

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

D. $a^{\frac{4}{3}}$

Answer: A

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7. The area of the triangle formed by the co-ordinate axes and a tangent to the curve $xy = a^2$ at the point (x_1, y_1) on it is :

A. 8.sq.units

B. 6 sq.units

C. 64 sq.units

D. 128 sq.unts

Answer: C

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8. The curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ touches the straight line $\frac{x}{a} + \frac{y}{b} = 2$ at the point (a, b) :

A. 2

B. 3

C. 4

D. Any real number

Answer: D

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9. The tangent to the parabola $x^2 = 2y$ at the point (1,1/2) makes with x-axis an angle

A. 0^o

B. 45^o

C. 30^o

D. 60^o

Answer: B

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10. The points on the curve $y = 12x - x^3$, the tangents at which are parallel to x-axis are :

A. (2,16),(-2,16)

B. (-2,16),(2,-16)

C. (2,16),(-2,-16)

D. None of these

Answer: C

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

A. 2

B. 4

C. $\frac{9}{2}$

D. 6

Answer: C

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12. If the circles $x^2 + y^2 - 2x - 2y - 7 = 0$ and $x^2 + y^2 + 4x + 2y + k = 0$ cut orthogonally,

then the length of the common chord of the circles is

A. 6

B. 4

C. 7

D. 9

Answer: C

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13. Out of the four curves given below choose the curve which intersects the parabola $y^2 = 4ax$ orthogonally.

A. $x^2 + y^2 = a^2$

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

C. y = ax

D. $x^2 = 4ay$

Answer: B

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

A. 3

B. $\frac{4}{3}$

C. $\frac{3}{4}$

D. 2

Answer: D

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15. Angle of intersection of the curves $y = x^2$ and $6y = 7 - x^3$ at (1,1)

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

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

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

D. $\frac{\pi}{6}$

Answer: C

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16. The line $4x + 6y + 9 = 0$ touches the parabola $y^2 = 4x$ at the point

A. (2,4)

B. (4,2)

C. (-2,4)

D. (-4,2)

Answer: B

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17. Angle of intersection of the curves $y = 4 - x^2$ and $y = x^2$ is

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

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

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

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

Answer: C

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18. The curve $\frac{x^2}{25} + \frac{y^2}{16} = 2$ touches the line x/5 + y/4 = 2 at the point

A. (5,4)

B. (4,5)

C. (-5,4)

D. (4,-5)

Answer: A

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19. The parabolas $y = x^{2+ax+b}$ and y=x(c-x) touch each other at (1,0). Then a, b, c are respectively,

A. 3,2,-1

B. -3,2,1

C. 3,-2,1

D. - 3, -2 , 1

Answer: B

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20. For the curve $xy^m = a^{m+1}$ the length of the subnormal at any point is a constant. Then the value of m must be

A. 2

B. -1

C. -2

D. 1

Answer: C

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21. If the subnormal at any point on the curve $y^n = ax$ is a constant, then n=

A. 2

B. 1

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

D. -2

Answer: A

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22. The length of subtangent at any point (x,y) on $y = 4e^{\frac{x}{7}}$ is

A. $\frac{y^2}{7}$

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

C. 7

D. $\frac{1}{7}$

Answer: C

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23. The lengths of the subnormal and subtangent to the parabola $y^2 = 8x$ at (2,-4) are respectively

A. 8,2

B. 6,4

C. 4,4

D. 2,8

Answer: C

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

A. 1:1

B. 2:1

C. 3:1

D. 1:2

Answer: B

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25. For the curve $x^3y^3 = 32$, the length of the subtangent at (2,-2) is

A. -4

B. 2

C. $-\frac{3}{4}$

D. $\frac{3}{4}$

Answer: B

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26. For the curve $y = ax^n$ the length of the subnormal at any point is a constant. The value of n must be

A. 3

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

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

D. 1

Answer: C

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27. Subnormal to the curve $xy = \frac{c^2}{2}$ at (c/2,c) is

A. 2c

B. - 2c

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

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

Answer: B

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28. The subtangent at $x = \frac{\pi}{2}$ on the curve y = x . sin x is

A. 0

B. `

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

D. None of these

Answer: C

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29. The length of the subnormal to the curve $x^2 - y^2 = 12$ at (4,-2) is

A. -2

B. 2

C. 4

D. 8

Answer: C

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30. The length of the subnormal at 't' on the curve$x = a(t + \sin t), y = a(1 - \cos t)$ is

A. $a \sin t$

B. $2a \sin^3\left(\frac{t}{2}\right).\sec\left(\frac{1}{2}\right)$

C. $\sin\left(\frac{t}{2}\right).\tan\left(\frac{t}{2}\right)$

D. $2a \sin\left(\frac{t}{2}\right)$

Answer: B

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31. The length of the subtangent at t on the curve $x = a(t + \sin t), y = a(1 - \cos t)$ is

A. a sin t

B. 2a sin^(3) (t/2) . sec (1/2)

C. 2a sin (t/2). tan (t/2)

D. 2a sin (t/2)

Answer: A

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32. The length of the subnormal at any point(x,y) on the curve $y^2 = 4ax$ is

A. $2a$

B. $2x$

C. $\frac{y^2}{2a}$

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

Answer: B

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

A. 24

B. (8/3)

C. (3/8)

D. None of these

Answer: A

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

A. 2

B. (1/2)

C. (-3)

D. 4

Answer: A

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

A. 3a

B. 2a

C. a

D. 4a

Answer: C

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36. The length of the subtangent for the curve $x^5 = 2y^6$ at (1/2,1/2) is

A. (5/3)

B. (6/5)

C. (-3/5)

D. (3/5)

Answer: D

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37. The length of the subtangent for the curve $2y^2 = x^3$ at (2,2) is

A. (4/3)

B. (3/4)

C. (3/2)

D. (2/3)

Answer: A

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38. The square of the subtangent to the curve $(x+a)^3 = by^2$ is proportional to

A. $(\text{subnormal})^3$

B. subnormal

C. $(\text{subnormal})^{\frac{1}{2}}$

D. $(\text{subnormal})^2$

Answer: B

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

A. AP

B. G.P

C. H.P

D. None of these

Answer: B

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40. Subtangent at any point (x,y) on $y = ae^{\frac{x}{b}}$ is

A. $\frac{y^2}{b}$

B. y/b

C. b

D. None of these

Answer: C

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41. If s = 5 sin 2t, then the velocity at the end of $\frac{\pi}{4}$ second is

A. 10

B. 0

C. 5

D. None of these

Answer: B

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42. The distance s feet travelled by a particle in time t seconds is given by $s = t^3 - 6t^2 - 4t - 8$. Its acceleration vanishes at time t =

A. t

B. 980 g

C. gt

D. πt

Answer: C

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43. If the displacement of a particle is nil then distance travelled will be

A. a constant

B. directly proportional to displacement

C. inversely proportional to displacement

D. None of these

Answer: A

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44. If the displacement s at a time t is given by $s = \sqrt{1-t}$, than the velocity is

A. directly proportional to displacement

B. inversely proportional to displacement

C. equal to displacement

D. None of these

Answer: B

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45. An edge of a variable cube is increasing at the rate of 10 cm per second. Then the volume of the cube is increasing when the edge is 5 cm long, at the rate

A. $650\frac{(cm)^3}{\sec}$

B. $550\frac{(cm)^3}{\sec}$

C. $750\frac{(cm)^3}{\sec}$

D. $900\frac{(cm)^3}{\sec}$

Answer: C

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46. The rate of change of the volume of the sphere w.r.t its surface area, when its radius is 2cm is

A. $1\frac{(cm)^3}{(cm)^2}$

B. $2\frac{(cm)^3}{(cm)^2}$

C. $3\frac{(cm)^2}{(cm)^3}$

D. $4\frac{(cm)^3}{(cm)^2}$

Answer: A

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47. The volume of the sphere is increasing at a constant rate. Then the radius is increasing at a rate

A. inversely proportional to the radius

B. inversely proportional to the square of the radius

C. directly proportional to radius

D. directly proportional to square of the radius

Answer: B

48. A rod of length 13 metres. has its end P on the x-axis and the other end Q on the y-axis. If P moves along the x -axis with a speed of 12 m/sec, then the speed of the other end Q when it is 12 metres from the origin is

A. (-3 m/sec)

B. 5 m/sec

C. (-5 m/sec)

D. (-4 m/sec)

Answer: C

49. With a given surface area, the volume of a right circular cylinder will be maximum if the height is

A. equal to the diameter of the base

B. equal to the radius of the base

C. three times the radius

D. 3/2 times the radius

Answer: A

50. The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area increases, when side is 10cm is

A. $\sqrt{3}Sq.\ unit\frac{s}{\sec}$

B. 10 Sq. units/sec`

C. $10\sqrt{3} Sq.\ unit \frac{s}{\sec}$

D. $\frac{10}{\sqrt{3}} Sq.\ unit \frac{s}{\sec}$

Answer: C

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51. If the line $ax + by + c = 0$ is a normal to the curve $xy = 1$, then :

A. $a > 0, b > 0$

B. $a > 0, b < 0$ or $a < 0, b > 0$

C. $a < 0, b < 0$

D. $a > 0, b < 0$

Answer: B

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52. The curve $y = x^{1/5}$ has at (0, 0) :

A. a vertical tangent

B. a horizontal tangent

C. an oblique tangent

D. no tangent

Answer: A

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53. The line $\frac{x}{a}+\frac{y}{b}=1$ touches the curves $y=be^{-x/a}$ at the point :

A. (a, b/a)

B. (-a, ba)

C. (a, b/a)

D. (0, b)

Answer: D

54. The normal at the point (1,1) on the curve $2y = 3 - x^2$ is

A. x+y=0

B. x+y+1=0

C. x-y+1 =0

D. x-y = 0

Answer: D

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55. If the slope of the normal to the curve $x^3 = 8a^2y, a > 0$ at a point in the first quadrant is $-\frac{2}{3}$, then the point is :

A. (2a, -a)

B. (2a, a)

C. (a, 2a)

D. (-a, a)

Answer: B

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56. The point on the curve $y = 6x - x^2$ where the tangent is parallel to x-axis is

A. (0, 0)

B. (2,8)

C. (4, 0)

D. (3, 9)

Answer: D

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57. The area of the triangle formed by the co-ordinate axes and a tangent to the curve $xy = a^2$ at the point (x_1, y_1) on it is :

A. $\frac{a^2 x_1}{y_1}$

B. $\frac{a^2 y_1}{x_1}$

C. $2a^2$

D. $4a^2$

Answer: C

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58. The point on the curve $y = (x - 3)^2$, where the tangent is parallel to the chord joining (3, 0) and (4, 1) is :

A. (-7/2, 1/4)

B. (5/2, 1/4)

C. (-5/2, 1/4)

D. (7/2 , 1/4)

Answer: D

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59. The slope of the tangent to the curve :

$$x = a\sin t, y = a\left(\cos t + \log \tan \frac{t}{2}\right)$$

at the point 't' is :

A. (tan) t/2

B. cot t

C. tan t

D. (cot) t/2

Answer: B

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60. The equation of the horizontal tangent to the curve $y = e^x + e^{-x}$ is :

A. y =-2

B. y = -3

C. y = 2

D. y =1

Answer: C

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61. The points on the curve $y = 12x - x^3$, the tangents at which are parallel to x-axis are :

A. (-2, 16) and (2, -16)

B. (2, 16) and (-2, -16)

C. (2, 16) and (-2, 16)

D. (-2, -16) an d(2, -16)

Answer: B

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

A. 0

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

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

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

Answer: C

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

A. x/a + y/b = 2

B. x/a + y/b = 1/2

C. x/a - y/b = 2

D. ax + by = 2

Answer: A

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64. The curves $4x^2 + 9y^2 = 72$ and $x^2 - y^2 = 5$ at (3,2)

A. touch each other

B. cut orthogonally

C. intersect at 45^o

D. intersect at 60^o

Answer: B

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65. The angle between the curves xy = 2 and $y^2 = 4x$ at their point of intersection is

A. (1/3)

B. 3

C. 2

D. (2/3)

Answer: B

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66. The two curves $y^2 = 4x$ and $x^2 + y^2 - 6x + 1 = 0$ at the point (1,2)

A. intersect orthogonally

B. intersect at angle $\frac{\pi}{3}$

C. touch each other

D. intersect at an angle $\frac{\pi}{4}$

Answer: C

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67. The curve $y = ax^3 + bx^2 + cx + 5$ touches the x-axis at A(-2,0) and cuts the y-axis at a point B where its slope is 3. Then

A. a = 1/2, b = -3/4, c = 3

B. a = -1/2, b = -3/4, c = 3

C. a = 1/2, b = 3/4, c = 3

D. a = -1/2, b = 3/4, c= 3

Answer: B

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68. The abscissa of the point on the curve $xy = (c + x)^2$, the normal at which cuts off numerically equal intercepts from the axes of coordinates is

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

B. c

C. $2\sqrt{c}$

D. $\sqrt{c}$

Answer: A

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69. 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. a = 0 or b = 0

Answer: B

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70. The radius of a cylinder is increasing at the rate of 3 m/sec and its attitude is decreasing at the rate of 4m/sec. The rate of change of volume when radius is 4 metres and attitude is 6 metres is

A. 80πcubic m/sec.`

B. 144πcubic m/sec.`

C. 80 ` cubic m/sec.

D. 64 cubic m/sec.

Answer: A

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71. A particle moves so that the space described in time 't' is square root of a quadratic function of 't', then

A. acceleration varies at s^3

B. acceleration varies at 1/s

C. acceleration varies as $\frac{1}{s^3}$

D. acceleration varies as s

Answer: C

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72. On uniform heating, the side of a square sheet of metal is increasing at the rate of 0.02

cm/sec. The rate at which the area is increasing when the side is 10 cm long is :

A. $0.4c\frac{m^2}{\sec}$

B. $0.2c\frac{m^2}{\sec}$

C. $4.0c\frac{m^2}{\sec}$

D. $40c\frac{m^2}{\sec}$

Answer: A

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

A. $0.24\pi \frac{sq.\ cm}{\sec}$

B. $60\pi \frac{sq.\ cm}{\sec}$

C. $24\pi \frac{sq.\ cm}{\sec}$

D. $1.2\pi \frac{sq.\ cm}{\sec}$

Answer: A

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74. The rate of change of the area of a circle with respect to its radius r at r = 6 cm is

A. 10π

B. 12π

C. 8π

D. 11π

Answer: B

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75. The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 3x^2 + 36x + 5$. The marginal revenue, when $x = 15$ is

A. 116

B. 96

C. 90

D. 126

Answer: D

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76. The slope of the normal to the curve $y = 2x^3 + 3\sin x$ at x = 0 is

A. 3

B. (1/3)

C. (-3)

D. (-1/3)

Answer: D

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77. The line y = x + 1 is a tangent to the curve y^2 = 4x at the poin

A. (1,2)

B. (2,1)

C. (1, -2)

D. (-1,2)

Answer: A

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78. The maximum value of $[x(x-1)+1]^{\frac{1}{3}}$ is $0 \leq x \leq 1$ is

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

B. (1/2)

C. 1

D. 0

Answer: C

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79. The points on the curve $9y^2 = x^3$ where the normal to the curve makes equal intercepts with the axes are

A. $\left(4, (\pm)\frac{8}{3}\right)$

B. (4, - 8/3)

C. $\left(4, +\frac{3}{8}\right)$

D. $\left(+_4, \frac{3}{8}\right)$

Answer: A

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80. The normal at the point (1,1) on the curve $2y = 3 - x^2$ is

A. x+y =0

B. x-y =0

C. x+y+1 =0

D. x-y = 1

Answer: B

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81. The line y = mx+1 is a tangent to the curve $y^2 = 4x$ if the value of m is

A. 1

B. 2

C. 3

D. (1/2)

Answer: A

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82. The abscissa of the point on the curve $3y = 6x - 5x^3$, the normal at which passes through origin is :

A. 1

B. (1/3)

C. 2

D. (1/2)

Answer: A

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83. The two curves

$x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

A. touch each other

B. cut at right angles

C. cut at an angle $\frac{\pi}{3}$

D. cut at an angle $\frac{\pi}{4}$

Answer: B

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84. The tangent to the curve given by :

$x = e^t \cos t, y = e^t \sin t$ at $t = \frac{\pi}{4}$

makes with x-axis an angle :

A. 0

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

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

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

Answer: D

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85. The equation of the normal to the curve $y = \sin x$ at (0, 0) is :

A. x =0

B. y = 0

C. x+y = 0

D. x-y = 0

Answer: C

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86. The point on the curve $y^2 = x$, where the tangent makes an angle of $\frac{\pi}{4}$ with x-axis is :

A. (1/2, 1/4)

B. (1/4, 1/2)

C. (4,2)

D. (1,1)

Answer: B

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87. The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area increases, when side is 10cm is

A. $10cm^2/s$

B. $\sqrt{3}cm^2/s$

C. $10\sqrt{3}cm^2/s$

D. $\frac{10}{3}cm^2/s$

Answer: C

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88. A ladder, 5 meter long, standing on a horizontal floor, leans against a vertical wall. If the top of the ladder slides downwards at the rate of 10cm/sec then the rate at which the angle between the floor and the ladder is decreasing when lower end of the ladder is 2 meters from the wall is

A. 1/10 radian/sec

B. 1/20 radian/sec

C. 20 radian/sec

D. 10 radian/sec

Answer: B

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89. The curve $y = x^{1/5}$ has at (0, 0) :

A. a vertical tangent

B. a horizontal tangent

C. an oblique tangent

D. no tangent

Answer: A

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90. The equation of the normal to the curve $3x^2 - y^2 = 8$ which is parallel to the line x+3y = 8 is

A. 3x-y =8

B. 3x+y+8 =0

C. $x + 3y + 8 = 0$

D. x+3y =0

Answer: C

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91. If the curve $ay + x^2 = 7$ and $x^3 = y$, cut orthogonally at (1,1), then the value of 'a' is

A. 1

B. 0

C. (-6)

D. 6

Answer: D

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92. The equation of the tangent to the curve $y(1+x^2) = 2 - x$, where it crosses x-axis is

A. x+5y = 2

B. x-5y=2

C. 5x-y=2

D. 5x+y = 2

Answer: A

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93. Find points at which the tangent to the curve $y = x^3 - 3x^2 - 9x + 7$ is parallel to the x-axis.

A. A. (2, -2), (-2, -34)

B. B. (2, 34),(-2, 0)

C. C. (0,34), (-2, 0)

D. D. (2,2),(-2,34)

Answer: D

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94. The tangent to the curve $y = e^{2x}$ at the point (0,1) meets x-axis at

A. (0,1)

B. (-1/2, 0)

C. (2,0)

D. (0,2)

Answer: B

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95. The slope of the tangent to the curve $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is

A. (22/7)

B. (6/7)

C. (-6/7)

D. (-6)

Answer: B

Watch Video Solution

96. A cylindrical tank of radius 10m is being filled with wheat at the rate of 314 cubic metre per hour. The depth of the wheat is increasing at the rate of

A. 1 m/h

B. 0.1 m/h

C. 1.1 m/h

D. 0.5 m/h

Answer: A

 Watch Video Solution

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

A. $0.24\pi sq.\ c\frac{m}{\sec}$

B. $60\pi sq.\ c\frac{m}{\sec}$

C. $24\pi sq.\ c\frac{m}{\sec}$

D. $1.2\pi sq.\ c\frac{m}{\sec}$

Answer: A

Watch Video Solution

98. The approximate value of $\sqrt[3]{63}$ correct to four decimal places is

A. 3.7929

B. 3.9792

C. 3.7992

D. 3.9279

Answer: B

Watch Video Solution

99. Approximate value of $f(x) = 2x^3 + 7x + 1$ at x = 2.001 is

A. 31.231

B. 31.13

C. 31.031

D. 31.321

Answer: C

Watch Video Solution

100. The approximate value of $\tan\left(45^o, 30'\right)$ given $1^o = 0.0175 radians$, is

A. 1.0187

B. 1.187

C. 1.0716

D. 1.0175

Answer: D

Watch Video Solution

101. Find the value of $\cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$

A. 0.8716

B. 0.8616

C. 0.8816

D. 0.8916

Answer: B

Watch Video Solution

102. If the radius of a sphere is measured as 7 m with an error of 0.02m, then approximate error in calculating its volume.

A. $\frac{sqr3}{2400}bc\pi$

B. (bc)/2400 pi`

C. $\frac{\sqrt{3}}{240}bc\pi$

D. $\frac{\sqrt{3}}{24}bc\pi$

Answer: A

Watch Video Solution

103. Each edge of a cube is increased by 50%. Find the percentage increase in the surface area.

A. 0.03

B. 0.04

C. 0.05

D. 0.06

Answer: D

Watch Video Solution

104. The length of the subnormal at any point(x,y) on the curve $y^2 = 4ax$ is

A. 2x

B. 2a

C. 4a

D. None of these

Answer: B

Watch Video Solution

105. The length of the sub - tangent to the curve $x^m y^n = a^{m+n}$ at any point (x_1, y_1) on it is

A. $\frac{mx_1}{n}$

B. $-\frac{ny_1}{m}$

C. $-\frac{my_1}{n}$

D. $-\frac{nx_1}{m}$

Answer: D

Watch Video Solution

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

A. 3

B. 5

C. 15

D. (3/5)

Answer: C

Watch Video Solution

107. The abscissae of the points where the tangent to curve $y = x^3 - 3x^2 - 9x + 5$ is parallel to x axis are

A. x =-1, 3

B. x = -3, 1

C. x = 1, -1

D. x = 0

Answer: A

Watch Video Solution

108. The point at which the tangent to the curve $y = 2x^2 - x + 1$ is parallel to $y = 3x + 9$ is

A. (-2,1)

B. (3,9)

C. (1,2)

D. (2,1)

Answer: C

Watch Video Solution

109. The equation to the tangent to the curve $y = be^{-\frac{x}{a}}$ at the point where it crosses the y-axis is

A. x/a - y/b =1

B. ax + by = 1

C. ax - by =1

D. x/a + y/b = 1

Answer: D

Watch Video Solution

110. The slope of the tangent to the curve $x = 3t^2 + 1, y = t^3 - 1$ at x=1 is

A. (1/2)

B. 0

C. (-2)

D. ∞

Answer: B

Watch Video Solution

111. For the curve $xy = c^2$ the subnormal at any point varies as

A. x^3

B. x^2

C. y^3

D. y^2

Answer: C

Watch Video Solution

112. For the curve $y^n \equiv a^{n-1}x$ if the subnormal at any point is a constant then n=

A. 3

B. 0

C. 1

D. 2

Answer: D

Watch Video Solution

113. If ST and SN are the lengths of the subtangent and the subnormal at the point $\theta = \frac{\pi}{2}$ on the curve $x = a(\theta + \sin\theta), y = a(1 - \cos\theta), a \neq 1$ then...

A. $ST^2 = a.\ SN^3$

B. $ST^3 = a.\ SN$

C. ST = SN

D. ST = 2SN

Answer: C

Watch Video Solution

114. If is the acute angle of intersection at a real point of intersection of the circle $x^2 + y^2 = 5$ and the parabola $y^2 = 4x$ then tan is equal to...

A. 1

B. $\sqrt{3}$

C. 3

D. $\frac{1}{\sqrt{3}}$

Answer: C

Watch Video Solution

115. If the curve $y = 2x^3 + ax^2 + bx + c$ passes through the origin and the tangents drawn to it at $x = -1$ and x = 2 are parallel to the X - axis, then the values a, b and c are respectively

A. 3, -12 and 0

B. (-3, 12 and 0)

C. (-3, -12 and 0)

D. 12, -3 and 0

Answer: C

Watch Video Solution

116. The tangent and the normal drawn to the curve $y = x^2 - x + 4$ at $P(1, 4)$ cut the X-axis at A and B respectively. If the length of the substangent drawn to the curve at P is equal to the length of the subnormal, then the area of the triangle PAB in sq. units is

A. 16

B. 8

C. 32

D. 4

Answer: A

 Watch Video Solution

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

A. 2a

B. (a/2)

C. (a/3)

D. a

Answer: D

Watch Video Solution

118. The point on the curve $y^2 = x$ where the tangent makes an angle $\frac{\pi}{4}$ with X-axis is

A. (1/2,1/4)

B. (1/4,1/2)

C. (1/2,1/2)

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

Answer: B

 Watch Video Solution

119. The point(s) on the curve $y^3 + 3x^2 = 12y$, where the tangent is vertical, is (are) :

A. $\left(\sqrt{2}, \sqrt{128}\right)$

B. $\left(\sqrt{128}, \sqrt{2}\right)$

C. $\left(2, \sqrt{128}\right)$

D. $\left(\sqrt{128}, 2\right)$

Answer: B

Watch Video Solution

120. The equation of the tangent to the curve $x^n + y^n = 2a^n$ at (a, a) is

A. x+y = a

B. x+y = 2a

C. $x + y = a^n$

D. $x + y = 2a^n$

Answer: B

Watch Video Solution

121. The volume of a ball is increasing at the rate of $4\pi c$. c /sec. The rate of increase of the radius when the volume is 288π is

A. 1/6 mm/sec

B. 1/36 cm/sec

C. 1/9 cm/sec

D. 1/24 cm/sec

Answer: B

Watch Video Solution

122. The speed ν of the particle moving along straight line is given by $a + bv^2 = x^2$, where x is its distance from the origin. The acceleration of the particle is

A. x/b

B. x/(ab)

C. abx

D. ax

Answer: A

123. If the area of an expanding circular region increases at a constant rate with respect to time, then the rate of increase of the perimeter with respect to time

A. varies inversely as the radius

B. varies directly as the radius

C. remains constant

D. varies directly as square of the radius

Answer: A

 Watch Video Solution

124. The rate of change of the surface area of a sphere of radius r when the radius is increasing at the rate of 2cm/sec is proportional to

A. $\left(\frac{1}{r^2}\right.$

B. (1/r)

C. r^2

D. r

Answer: D

Watch Video Solution

125. If the distance 's' metres traversed by a particle in 1 seconds is given by $s = t^3 - 3t^2$, then the velocity of the particle when the acceleration is zero, in metres/sec. is

A. 3

B. (-2)

C. (-3)

D. 2

Answer: C

126. A spherical balloon is being inflated at the rate of 35 cc//min. The rate of increase of the

surface area of the balloon when its diameter is 14 cm is...

A. 7 sq.cm/min

B. 10 sq.cm/min

C. 17.5 cm/min

D. 28 sq.cm/min

Answer: B

 Watch Video Solution

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

A. 1

B. 2

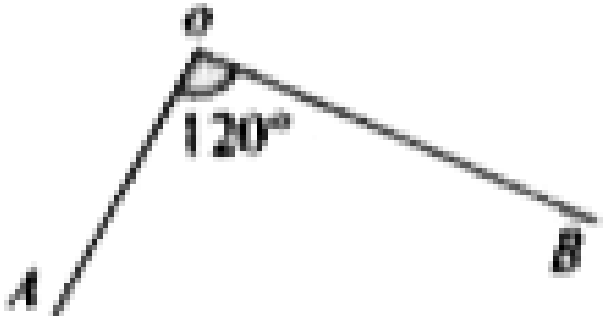
C. 3

D. 4

Answer: D

Watch Video Solution

128. OA and OB are two roads enclosing an angle of 120°.X and y start from 'O' at the same time. X travels along OA with a speed of $\frac{4km}{hour}$ and Y travels along OB with a speed of $\frac{3km}{hour}$.The rate at which the shortest distance between X and Y is increasing after 1 hour is



A. 37 km/hour

B. $\sqrt{37}k\frac{m}{h}our$

C. $\sqrt{13}k\frac{m}{h}our$

D. 13 km/hour

Answer: B

Watch Video Solution

129. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 - 2 = 0$:

A. cut at right angles

B. touch each other

C. cut at an angle $\frac{\pi}{3}$

D. cut at an angle $\frac{\pi}{4}$

Answer: A

Watch Video Solution

130. A function y = f(x) has a second order derivative $f''(x) = 6(x-1)$. If its graph passes thro' the point (2, 1) and at the point the tangent to the graph is $y = 3x - 5$, then the function is :

A. $(x-1)^2$

B. $(x-1)^3$

C. $(x+1)^3$

D. $(x+1)^2$

Answer: B

Watch Video Solution

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

A. (a,0)

B. (0, a)

C. (0, 0)

D. (a, a)

Answer: A

Watch Video Solution

132. The normal to the 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 angle $\frac{\pi}{2} + \theta$ with the x-axis

B. it passes through the origin

C. it is at constant distance from the origin

D. it passes through $\left(\frac{a\pi}{2}, -a\right)$

Answer: A

Watch Video Solution

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

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

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

C. $\frac{\pi}{6}$

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

Answer: A

Watch Video Solution

134. A spherical iron ball 10 cm in radius is coated with a layer of ice of uniform thickness that melts at a rate of $50cm^3/\text{min}$. When the

thickness of ice is 5 cm, then the rate at which the thickness of ice decreases, is :

A. $\frac{1}{18\pi} c \frac{m}{\min}$

B. $\frac{1}{36\pi} c \frac{m}{\min}$

C. $\frac{5}{6\pi} c \frac{m}{\min}$

D. $\frac{1}{54\pi} c \frac{m}{\min}$

Answer: A

Watch Video Solution

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

A. (2,4)

B. (2, -4)

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

D. (9/8,9/2)

Answer: D

Watch Video Solution

136. The area of the triangle formed by the co-ordinate axes and a tangent to the curve $xy = a^2$ at the point (x_1, y_1) on it is :

A. $\frac{a^2 x_1}{y_1}$

B. $\frac{a^2 y_1}{x_1}$

C. $2a^2$

D. $4a^2$

Answer: C

Watch Video Solution

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

A. (1,1)

B. at a point

C. (0,1)

D. (1,0)

Answer: D

Watch Video Solution

138. If the parametric equation of a curve is given by $x = e^t \cos t, y = e^t \sin t$, then the tangent to the curve at the point $t = \frac{\pi}{4}$ makes with the x-axis of the angle.

A. 0

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

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

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

Answer: D

 Watch Video Solution

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

A. a = 2, b =-7

B. a = -2, b =7

C. a =-2, b =-7

D. a = 2, b = 7

Answer: A

Watch Video Solution

140. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the co-ordinate axes, lies in the first quadrant. If its area is 2, then the value of b is :

A. (-1)

B. 3

C. (-3)

D. 1

Answer: C

Watch Video Solution

141. If the normal to the curve y = f(x) at the point (3, 4) makes an angle $3\pi/4$ with the positive x-axis, then $f'(3)$ is :

A. (-1)

B. (-3/4)

C. (4/3)

D. 1

Answer: D

Watch Video Solution

142. If $x + y = k$ is normal to $y^2 = 12x$, then k is :

A. 3

B. 9

C. (-9)

D. (-3)

Answer: B

Watch Video Solution

143. The point(s) on the curve $y^3 + 3x^2 = 12y$, where the tangent is vertical, is (are) :

A. $\left(\pm \frac{4}{\sqrt{3}}, 0 \right)$

B. $\left(\pm \sqrt{\frac{11}{3}}, 1 \right)$

C. (0,0)

D. $\left(\pm \frac{4}{\sqrt{3}}, 2 \right)$

Answer: D

Watch Video Solution

144. The line $2x + \sqrt{6}y = 2$ is a tangent to the curve $x^2 - 2y^2 = 4$. The point of contact is :

A. $\left(4, -\sqrt{6}\right)$

B. $\left(7, -2\sqrt{6}\right)$

C. (2,3)

D. `(sqrt6, 7)

Answer: A

Watch Video Solution

145. The angle between the curves y = sinx and y = cos x is

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

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

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

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

Answer: A

Watch Video Solution

146. If θ is the angle between the curves xy = 2 and $x^2 + 4y = 0$ then $\tan\theta =$

A. 1

B. (-1)

C. 2

D. 3

Answer: D

Watch Video Solution

147. 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

148. The curves $x = y^2$ and $xy = a^3$ cut orthogonally at a point, then $a^2 =$

A. (1/3)

B. (1/ 2)

C. 2

D. 3

Answer: B

Watch Video Solution

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

A. y = x+5

B. x+y = 7

C. 2x+y = 8

D. x+2y = 13

Answer: A

Watch Video Solution

150. 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

Watch Video Solution

151. The slope of the nomal to the curve $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ at $\theta = \frac{\pi}{2}$ is

A. 0

B. 1

C. (-1)

D. $\frac{1}{\sqrt{2}}$

Answer: C

Watch Video Solution

152. 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

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

A. 2

B. 3

C. 4

D. 1

Answer: C

Watch Video Solution

154. For a particle moving on a straight line it is observed that the distance 's' and time 't' is given by $s = 6t - \frac{1}{2}t^3$. The maximum velocity during the motion is

A. 3

B. 6

C. 9

D. 12

Answer: B

 Watch Video Solution

155. A cylindrical vessel of radius 0.5 mts is filled with oil at the rate of $0.25\pi c.\, mt\frac{s}{\min}$. The rate at which the surface of the oil is increasing is

A. 1 mts/min

B. 2 mts/min

C. 5 mts/min

D. 1.25 mts/min

Answer: A

Watch Video Solution

156. The distance moved by the particle in time t is given by $x = t^3 - 12t^2 + 6t + 8$ 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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157. Gas is being pumped into a spherical balloon at the rate of $30\frac{(ft)^3}{\min}$. Then the rate at which the radius increases when it reaches the value 15ft is

A. $\frac{1}{30\pi}\frac{ft}{\min}$

B. $\frac{1}{5\pi}\frac{ft}{\min}$

C. 1/20 ft/min

D. 1/25 ft/min

Answer: A

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158. A point is moving on $y = 4 - 2x^2$. The x coordiante of the point is decreasing at the rate of 5 units per second. Then the rate at which y coordinate of the point is changing when the point is at (1,2) is

A. 5 units/sec

B. 10 units/sec

C. 15 units/sec

D. 20 units/sec

Answer: D

Watch Video Solution

159. The particle moves along the curve $y = x^2 + 2x$ Then the point on the curve such that x and y coordiantes 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

Watch Video Solution

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

A. 24500

B. 12500

C. 12250

D. 25400

Answer: C

Watch Video Solution

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

A. $0.24\pi sq.\ c\frac{m}{\sec}$

B. $60\pi sq.\ c\frac{m}{\sec}$

C. $24\pi sq.\ c\frac{m}{\sec}$

D. $1.2\pi sq.\ c\frac{m}{\sec}$

Answer: A

Watch Video Solution

162. A particle moves along a straight line such that its displacement at any time t is given by $x = t^3 - 6t^2 + 3t + 4$ in m. The velocity when acceleration is zero is

A. A. $0 < t < \frac{3}{2}$

B. B. $0 < t < 1$

C. C. $0 < t\frac{2}{3}$

D. D. $\frac{1}{2} < t < 1$

Answer: C

Watch Video Solution

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

A. A. 2

B. B. 4

C. C. 0.25

D. D. 2.5

Answer: C

Watch Video Solution

164. The velocity v m/sec of particle is proportional to the cube of the time. If the velocity after 2 secs is 4m/sec, then v is equal to :

A. t^3

B. $\frac{t^3}{2}$

C. $\frac{t^3}{3}$

D. $\frac{t^3}{4}$

Answer: B

Watch Video Solution

165. The point on the curve $\sqrt{x}+\sqrt{y}=\sqrt{a}$ at which the normal is parallel to the x-axis is

A. (0,0)

B. (0,a)

C. (a,0)

D. (a, a)

Answer: B

Watch Video Solution

166. If $4x^2 + py^2 = 45$ and $x^2 - 4y^2 = 5$ cut orthogonally, then the value of p is

A. (1/9)

B. (1/3)

C. 3

D. 9

Answer: D

167. The volume of the sphere is increasing at a constant rate. Then the radius is increasing at a rate

A. a constant

B. proportional to the radius

C. inversely proportional to radius

D. inversely proportional to surface area

Answer: D

168. If a particle is moving such that the velocity acquired is proportional to the square root of the distance covered, then its acceleration is

A. a constant

B. αs^2

C. $\alpha \frac{1}{s^2}$

D. αs

Answer: A

Watch Video Solution

169. The radius of a cylinder is increasing at the rate of 3 m/sec and its attitude is decreasing at the rate of 4m/sec. The rate of change of volume when radius is 4 metres and attitude is 6 metres is

A. $80\pi cum/\text{sec}$

B. $144\pi cum\text{sec}$

C. $-80cum/\text{sec}$

D. $64cum/\text{sec}$

Answer: A

Watch Video Solution

170. A ladder 5 m long is leaning against a wall. The bottom of the ladder is pulled along the ground, away from the wall, at the rate of 2cm/s.

How fast is its height on the wall decreasing when the foot of the ladder is 4 m away from the wall ?

A. A. $4\sqrt{3}m$

B. B. $5\sqrt{3}m$

C. C. $5\sqrt{2}m$

D. D. 6m

Answer: D

Watch Video Solution

171. If the line y = 2x+k is a tangent to the curve $x^2 = 4y$ then k =

A. 4

B. (1/2)

C. (-4)

D. (-1/2)

Answer: C

Watch Video Solution

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

A. (1,0)

B. at no point

C. (0,1)

D. (0,0)

Answer: A

Watch Video Solution

173. 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. data is insufficient

Answer: B

Watch Video Solution

174. The tangent drawn at the point (0,1) on the curve $y = e^{2x}$ meets x-axis at the point

A. (1/2, 0)

B. (-1/2,0)

C. (2,0)

D. (0,0)

Answer: B

 Watch Video Solution

175. An equation of the tangent to the curve $y = x^4$ from the point (2,0) not on the curve is

A. y =0

B. x =0

C. x+y =0

D. None of these

Answer: A

Watch Video Solution

176. At what point on the curve $x^3 - 8a^2y = 0$ the slope of the normal is -2/3?

A. (a, a)

B. (2a, -a)

C. (2a, a)

D. None of these

Answer: C

 Watch Video Solution

177. Coordinates of a point on the curve y = x log x at which the normal is parallel to the line 2x-2y=3 are

A. (0,0)

B. (e,e)

C. $\left(e^2, 2e^2\right)$

D. $\left(e^{-2}, -2e^{-2}\right)$

Answer: D

Watch Video Solution

178. The distance s metres covered by a body in t seconds, is given by $s = 3t^2 - 8t + 5$, the body will stop after

A. 1 sec

B. 3/4 sec

C. 4/3 sec

D. 4 sec

Answer: C

Watch Video Solution

179. If the curve $y = a^x$ and $y = b^x$ intersect at angle α, then tan α is equal to

A. (a-b)/(1+ab)

B. (log a - log b)/(1+ log a log b)

C. (a + b)/(1- ab)

D. (log a + log b)/(1- log a log b)

Answer: B

Watch Video Solution

180. If x+y= k is a normal to $y^2 = 12x$, then k =

A. 3

B. 9

C. (-9)

D. (-3)

Answer: B

Watch Video Solution

181. The curves $x = y^2$ and $xy = a^3$ cut orthogonally at a point, then $a^2 =$

A. (1/3)

B. 3

C. 2

D. (1/2)

Answer: D

 Watch Video Solution

182. The angle between the curves y = sinx and y = cos x is

A. $tna^{-1}\left(2\sqrt{2}\right)$

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

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

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

Answer: A

Watch Video Solution

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

A. A. 30^o

B. B. 45^o

C. C. 60^o

D. D. 90^o

Answer: D

Watch Video Solution

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

A. A. x+2y = 3a

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

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

D. D. 4x-3y = a

Answer: C

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185. The line which is parallel to x-axis and crosses the curve $y = \sqrt{x}$ at an angle of 45^o is

A. y = 1/4

B. y = 1/2

C. y =1

D. y =4

Answer: B

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186. The tangent to a given curve $y = f(x)$ is perpendicular to the x-axis if

A. dy/dx

B. dy/dx =1

C. dx/dy = 0

D. dx/dy =1

Answer: C

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187. The equation of the normal to the curve $y = \sin x$ at (0, 0) is :

A. x = 0

B. y =0

C. x+Y =0

D. x-y = 0

Answer: C

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188. $x = a\cos\theta, y = b\sin\theta.$

A. π

B. 0

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

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

Answer: D

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189. If the line $ax + by + c = 0$ is a normal to the curve $xy = 1$, then :

A. $(a > 0, b > 0)$ or $(a < 0, b < 0)$

B. $(a > 0, b < 0)$ or $(a < 0, b > 0)$

C. $(b \leq 0, a \leq 0)$ or $(a \geq 0, b \leq 0)$

D. $(a \leq 0, b \leq 0)$ or $(a \geq 0, b \geq 0)$

Answer: B

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190. For the curve $x = t^2 - 1, y = t^2 - t$ the tangent line is perpendicular to x-axis when

A. t = 0

B. $t = \infty$

C. $t = \frac{1}{\sqrt{3}}$

D. $t = -\frac{1}{\sqrt{3}}$

Answer: A

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191. The line $\frac{x}{a}+\frac{y}{b}=1$ touches the curves $y=be^{-x/a}$ at the point :

A. (a, b/a)

B. (-a, b/a)

C. (a, a/b)

D. None of these

Answer: D

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192. If m is the slope of the tangent to the curve, $e^y = 1 + x^2$, then,

A. $|m| > 1$

B. $m < 1$

C. $|m| < 1$

D. $|m| \leq 1$

Answer: D

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193. 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: D

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194. The point at which the tangent to the curve $y = x^2 - 4x$ is parallel to x-axis is

A. (0,4)

B. (-2,4)

C. (2,4)

D. (2,-4)

Answer: D

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195. The curve $x = y^2$ and xy = k cut at right angles if

A. $2k^2 = 1$

B. $4k^2 = 1$

C. $6k^2 = 1$

D. $8k^2 = 1$

Answer: D

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196. The angle between the tangents to the curves $y = x^2 - 5x + 6$ at the point (2,0) and (3,0) is

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

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

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

D. $\frac{\pi}{6}$

Answer: C

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197. A particle is moving along the curve $x = at^2 + bt + c$. If $ac = b^2$, then the particle would be moving with uniform

A. rotation

B. velocity

C. acceleration

D. retardation

Answer: C

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198. The curve $\frac{x^n}{a^n} + \frac{y^n}{b^n} = 2$ touches the line, x/a + y/b = 2 at the point,

A. (b,a)

B. (a,b)

C. (1,1)

D. (1/b, 1/a)

Answer: B

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199. A particle moves in a straight line so that , $s = \sqrt{t}$, then its acceleration is proportional to

A. $(velocity)^3$

B. velocity

C. $(velocity)^2$

D. $(velocity)^{\frac{3}{2}}$

Answer: A

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200. The distance travelled by a motor car in t seconds after the brakes are applied is s feet where $s = 22t - 12t^2$. The distance travelled by the car before it stop is

A. 10.08 ft

B. 10 ft

C. 11 ft

D. 11.5 ft

Answer: A

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201. A stone is thrown vertically upwards and the height x ft, reached by the stone in t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in

A. 2.5 seconds

B. 2 seconds

C. 1.5 seconds

D. 3 seconds

Answer: A

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202. A stone is thrown vertically upwards from the top of a tower 64 metres high according to law $s = 48t - 16t^2$. The greatest height attained by the stone above the ground is

A. 100 metre

B. 64 metre

C. 36 metre

D. 32 metre

Answer: A

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203. The tangent to a given curve y=f(x) is perpendicular to the x -axis if

A. dx/dy =1

B. dy/dx =0

C. dy/dx =1

D. dx/dy =0

Answer: D

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204. A sphere increases its volume at the rate of π / s. The rate at which its surface area increases when the radius is 1 cm is

A. $2\pi sq.\ c\frac{m}{s}$

B. $\pi sq.\ c\frac{m}{s}$

C. $\frac{3\pi}{2} sq.\ c\frac{m}{s}$

D. $\frac{\pi}{2} sq.\ c\frac{m}{s}$

Answer: A

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205. The angle between $y^2 = 4x$ and $x^2 + y^2 = 12$ at a point of their intersection is

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

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

C. $\tan^{-1} 2\sqrt{2}$

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

Answer: C

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206. The slopes of the tangent and normal at (0, 1) for the curve $y = \sin x + e^x$ are respectively :

A. 1 and -1

B. (-1/2 and 2)

C. 2 and -1/2

D. (-1 and 1)

Answer: C

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207. If for the curve $y = 1 + bx - x^2$ the tangent at (1, -2) is parallel to x-axis, then b =

A. 2

B. (-2)

C. 1

D. (-1)

Answer: A

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208. The surface area of a ball is increasing at the rate of $2\pi sq.\ cm$/sec. The rate at which the radius increasing when the surface area is $16\pi sq.\ cm$ is

A. 0.125 cm/sec

B. 0.25 cm/sec

C. 0.5 cm/sec

D. 1 cm/sec

Answer: A

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209. If the area of an expanding circular region increases at a constant rate with respect to time, then the rate of increase of the perimeter with respect to time

A. directly as its radius

B. inversely as its radius

C. directly as the square of its radius

D. inversely as the square of its radius

Answer: B

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210. If $f(x) = x^{\alpha} \log x$ and $f(0) = 0$, then the value of α for which Roll's theorem can be applied in [0, 1] is :

A. (-2)

B. (-1)

C. 0

D. (1/2)

Answer: D

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

A. (9/8, 9/2)

B. (2,-4)

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

D. (2,4)

Answer: A

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212. If $2\ a+3b+6c=0, a, b, c \in R$ then the equation a $x^2+bx+c=0$ has a root in

A. (0, 1)

B. (1, 2)

C. (2,3)

D. None of these

Answer: A

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213. Let f be differentiable for all x. If $f(1) = -2, f'(x) \geq 2$ for all $x \in [1, 6]$, then :

A. f(6) =5

B. $f(6) < 5$

C. $f(6) < 8$

D. $f(6) \geq 8$

Answer: D

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214. If the equation $a_n x^n + a_{n-1} x^{n-1} + ... + a_1 x = 0, a_1 \neq 0, n \geq 2$, has a positive root x = α, then the equation n $a_n x^{n-1} + (n-1) a_{n-1} x^{n-1} + ... , a_1 = 0$ has a positive root, which is :

A. a positive root less than α

B. a positive root larger than α

C. a negative root

D. no positive root

Answer: A

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215. If $a+b+c=0$, then the equation $3ax^2+2bx+c=0$ has :

A. at least one root

B. at most one root

C. no root

D. None of these

Answer: A

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216. If $f(x)$ satisfiles requirements of Rolle's theorem in $[1, 2]$ and $f(x)$ is continuous in [1,2], then $\int_1^2 f'(x)dx$ is :

A. 3

B. 0

C. 1

D. 2

Answer: B

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217. Let $f(x) = e^x, x \in [0, 1]$, then a number c of the Lagrange's mean value theorem is

A. $\log_e(e-1)$

B. $\log_e(e+1)$

C. $\log_e e$

D. None of these

Answer: A

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218. If f(x) satisfies of conditions of Rolle's theorem on [3,5], then $\int_3^5 f(x)dx$ equals

A. 2

B. (-1)

C. 0

D. (-4/3)

Answer: D

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219. The function $f(x) = x(x+3)e^{-\frac{x}{2}}$ satisfies all the conditions of Rolle's theorem in [-3,0]. The value of c is

A. 0

B. (-1)

C. (-2)

D. (-3)

Answer: C

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220. In a triangle ABC if sides a and b remain constant such that α is the error in C, then relative error in its area is

A. A. $\alpha \cot C$

B. B. $\alpha \sin C$

C. C. $\alpha \tan C$

D. D. $\alpha \cos C$

Answer: A

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221. The circumference of a circle is measured as 56 cm with an 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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