MATHS

BOOKS - MARVEL MATHS (HINGLISH)

APLICATIONS OF DERIVATIVES

MULTIPLE CHOICE QUESTIONS (PART-A: Building -Up the BASE)

1. Gradient (slope) of the curve $y = 2 + x + x^2$ at the point $x = -1$ on it is

A. 0

B. -1

C. 2

D. 1

Answer: B

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2. Point at which the tangent to the curve $y = 3x - 2x^2$ has slope $m = -1$ is

A. $(0, 0)$

B. $(1, 1)$

C. $(-1, 1)$

D. $(1, -1)$

Answer: B

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3. Point (s) at which the tangent to the curve $y = x^3 - 3x^2 - 8x + 7$ has inclination 45° is (are)

A. $\left(\frac{5}{3}, \frac{4}{3}\right)$

B. $\left(-\frac{4}{3}, \frac{5}{3}\right)$

C. $(-1, 11), (3, -17)$

D. $(1, -11), (-3, 17)$

Answer: C

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4. If $A=(1,\ -3)$ and $B=(4,3)$ are points on the curve $y=x-\frac{4}{x}$ then the points on the curve at which the tangents are parallel to the chord AB are

A. $(1,3),(-3,4)$

B. $(\pm 2,0)$

C. $\left(8,\frac{14}{2}\right),\left(16,\frac{63}{4}\right)$

D. $(1,\ \pm 3)$

Answer: B

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5. Find the slope of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at $t = 2$.

A. $\frac{7}{6}$

B. $\frac{5}{6}$

C. $\frac{6}{7}$

D. 1

Answer: C

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6. Find the required point be $P(x_1, y_1)$. The tangent to the curve $\sqrt{x} + \sqrt{y} = 4$ at which tangent is equally inclined to the axes.

A. $(1, -2)$

B. $(0, 16)$

C. $(16, 0)$

D. $(4, 4)$

Answer: D

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7. If $y = f(x)$ be the equation of the line touching the line $y = 2x + 3$ at $x = 2$, then

A. $f'(2) = 2$

B. $f(2) = 2f'(2)$

C. $f(2) + f'(2) + f''(2) = 2$

D. $f(2) = 2$

Answer: A

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8. Inclination of the tangent to the curve $2x^4 + y^4 = 3$ at (1,1) is

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

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

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

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

Answer: D

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9. Inclination of the normal to the curve $xy = 15$ at the point $(3, 5)$ is

A. $\tan^{-1}\left(\frac{15}{9}\right)$

B. $-\tan^{-1}\left(\frac{9}{15}\right)$

C. $\tan^{-1}\left(\frac{9}{15}\right)$

D. $-\tan^{-1}\left(\frac{15}{9}\right)$

Answer: C

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10. Equation of the tangent and normal to the curve $y = x^2 - 4x + 3$ at the point $x = 4$ on it are respectively

A. $4x - y16, x + 4y = 13$

B. $4x - y = 13, x + 4y = 16$

C. $3x - y = 16, x + 3y = 13$

D. $4x + y = 13, x - 4y = 16$

Answer: B

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11. Equations to the tangent and normal to curve $y = x^3 + 2x^2 - 4x - 43$ at the point (-2,5) are respectively

A. $y = 5, x + 2 = 0$

B. $y + 5 = 0, x = 2$

C. $x = 2, y = 5$

D. $y + 5 = 0, x + 2 = 0$

Answer: A

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12. Equation of the tangent and normal to the curve $y = x^3 - 3x^2 - x + 5$ at the point $x = 3$ on it are respectively

A. $x - 8y = 19, 8x + y = 22$

B. $8x + y = 19, x - 8y = 22$

C. $8x - y = 22, x + 8y = 19$

D. $x + 3y = 19, 3x - y = 22$

Answer: C

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13. Equations of the tangent and normal to the curve $y=3\sqrt{x-1}$, at the point $x=1$, are repectively.

A. $x=1, x=0$

B. $y=1, y=0$

C. $x=0, y=1$

D. $x=1, y=0$

Answer: D

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14. Equation of the tangent and normal to the curve $xy=c^2$ at the point $x=c$ on it are respectively

A. $x - y = 2c, x = y$

B. $x + y + 2c = 0, x = y$

C. $x + y = 2c, x = y$

D. $x - y + 2c = 0, x + y = 0$

Answer: C

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15. Equations of the tangent and normal to the curve $x^3 + y^2 + 2x - 6 = 0$ at the point $y = 3$ on it are respectively

A. $5x = 13 - 6y, 5y = 6x + 21$

B. $5x - 6y = 13, 6x + 5y + 21 = 0$

C. $6x + 5y = 13, 5x - 6y + 21 = 0$

D. $6y = 13 + 5x, 5y = 6x + 21$

Answer: A

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16. Equation of the tangent and normal to the curve $x^5 + y^5 = 2xy$ at the point $(1, 1)$ are respectively.

A. $x - y = 2, x = y$

B. $x + y = 1, x = y$

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

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

Answer: C

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17. Equations of the tangent and normal to the curve $x^5 + y^5 = 2xy$ at the point $(2, 1)$ is

A. $4x + 67y = 134$

B. $4x - 67y = 138$

C. $x = 2$

D. $67x + 4y = 75$

Answer: D

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18. Equations of the tangent and normal to the curve $x^2 + y^2 + 4x - 7y + 5 = 0$ at the point $(1, 2)$ are

A. $x - 2y = 5, x + 2y = 5$

B. $y = 2x, x + 2y = 5$

C. $x = 1, y = 2$

D. $x + 2y + 5 = 0, 2x + y = 0$

Answer: B

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19. Equation of the tangent and normal to the curve $x = \frac{1}{t}, y = t - \frac{1}{t}$ at the pint $t = 2$ on it are respectively

A. $5x - y = 4, x + 5y + 7 = 0$

B. $x - 5y = 4, 5x + y + 7 = 0$

C. $5x + y = 4, x - 5y + 7 = 0$

D. $x + 5y = 4, 5x - y + 7 = 0$

Answer: C

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20. Equations of the tangent and normal to the curve $x = \sqrt{t}, y = t - \frac{1}{\sqrt{t}}$ at the point $t = 4$ are respectively

A. $17x - 4y = 20, 8x + 34y = 135$

B. $4x - 17y = 20, 34x + 8y = 135$

C. $7x - 4y = 20, 8x + 14y = 135$

D. $17x + 4y = 20, 34x - 8y = 135$

Answer: A

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21. Equation of the tangent and normal to the curve $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$ at the point $t = 2$ it are respectvely

A. $6x + 7y = 19, 7x - 6y = 8$

B. $6x - 7y = 19, 7x + 6y = 8$

C. $7x - 6y = 19, 6x + 7y = 8$

D. $7x + 6y = 19, 6x - 7y = 8$

Answer: B

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22. Equations of the tangent and normal to the curve $x = e^t \sin t, y = e^t \cos t$ at the point $t = 0$ on it are respectively

A. $y = x + 1, x + y = 1$

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

C. $x - y = 1, x + y = 2$

D. $x - y = 1, x + y + 2 = 0$

Answer: A

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23. If lines T_1 and T_2 are tangent to the curve $y = x^2 - 3x + 2$ at the points where the curve meets the X- axes , then

A. $T_1 \mid \mid T_2$

B. $T_1 \perp T_2$

C. $m\angle(T_1), T_2 = 45^\circ$

D. $m\angle(T_1), T_2 = 60^\circ$

Answer: B

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24. If lines T_1 touchs the curve $8y = (x-2)^2 at(-6, 8)$ and line T_2 touchs the curve $y = x + \frac{3}{x}$ at $(1, 4)$ then ,

A. $T_1 | | T_2$

B. $T_1 \perp T_2$

C. $m\angle(T_1, T_2) = \frac{\pi}{3}$

D. $m\angle(T_1, T_2) = \frac{\pi}{4}$

Answer: A

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25. Tangents to the curve $y = 2x^3 - 2$ at the points $x = \pm 2$ are

A. parallel

B. mutually prependicular

C. intersecting but not prependicular

D. skew

Answer: A

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26. Equation of the tangent to the curve $y = 2 - 3x - x^2$ at the point where the curve meets the Y -axes is

A. $x + 3y = 2$

B. $3x - y = 2$

C. $x - 3y = 2$

D. $3x + y = 2$

Answer: D

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27. Equations of tangents to the curve $y = x - \frac{1}{x}$ at the points where the curve meets the X- axes are

A. $y = \pm x$

B. $y = x \pm 1$

C. $y = 2x \pm 2$

D. $y = 3x \pm 3$

Answer: C

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28. Equations of tangents to the curve $y = x^2 - 3x + 2$, where it crosses the X- axes , are

A. $x + y = \pm 2$

B. $x \pm y = 1, 2$

C. $x - y = \pm 2$

D. $x \pm y = 3$

Answer: B

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29. Points at which the tangent to the curve $y = x^2(x - 2)^2$ is parallel to the X- axes are

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

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

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

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

Answer: C

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30. Point (s) at which the tangent to curve $y = \dfrac{1}{1 + x^2}$ is parallel to the X - axis are

A. $(-1/3, 23/27), (1, -1)$

B. $(1, -1), (-1/3, 5/27)$

C. $(-1, 1), (-3, 5)$

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

Answer: D

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31. Points at which the tangent to the curve $y + x = x^2(x - 1)$ is parallel to the X- axes are

A. $(-1/3, 23/27), (1, -1)$

B. $(, -1), (-1/3, 5/27)$

C. $(-1, 1), (-3, 5)$

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

Answer: B

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32. Point (s) at which the tangent to the curve $y=\dfrac{a^2x}{a^2+x^2}$ is parallel to the X - axes is (are)

A. $(\pm a, \pm a/2)$

B. $(\pm a/2, \pm a)$

C. $(\pm a, \pm 2a)$

D. $(\pm 2a, \pm a)$

Answer: A

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33. Points at which the tangent to the curve $y = \frac{x}{1 - x^2}$ has inclination 45°

A. $(\pm 1, 0)$

B. $(0, \pm 1)$

C. $(\pm 1, \pm 1)$

D. $(0, 0)\left(\pm\sqrt{3}, \pm\frac{\sqrt{3}}{2}\right)$

Answer: D

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34. Points (s) at which the tangent to the curve $y = x.\log x$ has inclination 45° is (are)

A. $\left(-\frac{1}{e}, \frac{1}{e}\right)$

B. $(1, 0)$

C. $(\pm e, \pm e)$

D. $(0, \pm 1)$

Answer: B

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35. Equation of the tangent to the curve $4y = x^2 + 3x + 2$, which is parallel to X-axis , is

A. $16y + 1 = 0$

B. $8y + 1 = 0$

C. $4y + 1 = 0$

D. $2y + 1 = 0$

Answer: A

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

A. $y = 21, y = -2$

B. $y = -21, y = 2$

C. $y = 12, y = -20$

D. $y = \pm 22$

Answer: C

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37. Equations of tangents to the curve $y = 2x^3 - 3x^2 - 12x + 20$, which are parallel to the X-axes, are

A. $x = 0, x = 27$

B. $y = -0, y = 27$

C. $y = 3, y = -27$

D. $x = \pm 3$

Answer: B

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38. Equations of tangents to the curv $y + x = x^2(x - 1)$, which are parallel to X-axis , are

A. $y + 1 = 0, 27y = 5$

B. $y = 1, 5y + 27 = 0$

C. $y = 1, 27y + 5 = 0$

D. $x + 1 = 0, 27x = 5$

Answer: A

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39. Equation of tangent to the curve $y = 5x^2 + \frac{80}{x}$, which is prependicular to Y-axes, is

A. $y = 30$

B. $y = 40$

C. $y = 50$

D. $y = 60$

Answer: D

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40. If the two tangents to the curve $y = ax^3 - 2x - 1$ at the poits $x = 1$ and $x = 3$ are both parallel to X-axes , then: a=

A. ± 2

B. $\frac{4}{3}, \frac{4}{27}$

C. $\frac{2}{3}, \frac{2}{27}$

D. $1, 3$

Answer: C

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41. If the line x+y=0 touches the curve $2y^2 = ax^2 + b$ at (1,-1), then

A. $(2, 0)$

B. $(0, 2)$

C. $(2, 2)$

D. $(3, 0)$

Answer: A

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42. If the line $y = 4x - 5$ touches the curve $y^2 = ax^3 + b$ at the point $(2, 3)$, then : $(a, b) \equiv$

A. $(2, -7)$

B. $(-2, 7)$

C. $(2, 7)$

D. $(-2, -7)$

Answer: A

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43. If the line $y = 4x + 2$ touches the curve $y = a + bx + 3x^2$ at the point where it crosses the Y-axes , then : $(a, b) \equiv$

A. $(4, 2)$

B. $(-4, -2)$

C. $(2, 4)$

D. $(-2, 4)$

Answer: C

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44. If the line $x+y=0$ touches the curve $y=x^2+bx+c$ at the point $x=-2$, then : $(b, c) \equiv$

A. $(4, 3)$

B. $(3, 4)$

C. $(2, 4)$

D. $(1, 3)$

Answer: B

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45. Find the equations of the tangent and the normal to the curve $y(x-2)(x-3)-x+7=0$ at the point where it cuts the x-axis

A. $20y-x+7=0, y+20x=140$

B. $x+20y=7, 20x-y=140$

C. $20x+y+7=0, x-20y=140$

D. $20y+x+7=0, y-20x=140$

Answer: A

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46. If the curve $y = \frac{x-4}{x-2}$ meets the X- and Y- and axes at A and B respectvely, then the tangents at A and B to the curve are

A. parallel

B. coincident

C. prependicular

D. not defind

Answer: A

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47. The equation of tangent to the curve $y = b^{-x/a}$ at the point where it crosses Y-axis is

A. $ax + by = 1$

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

C. $bx + ay = 1$

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

Answer: B

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48. Equation of tangent to the curve $\left(\frac{x}{a}\right)^{2009} + \left(\frac{y}{b}\right)^{2009} = 2$ at the point $x = a$ on it is

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

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

C. $\frac{x}{a} + \frac{y}{b} = 2009$

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

Answer: B

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49. If the tangent to the curve $y = \sin x$, at the point (a, b) on it, passes through the origin, then (i) $a^2(1 + b^2) = b^2$ (ii) $a^2(1 - b^2) = b^2$ (iii) $b^2(1 + a^2) = a^2$ (iv) $a^2 + b^2 = 1$

A. $a^2(1+b^2)=b^2$

B. $a^2(1-b)=b^2$

C. $b^2(1+a^2)=a^2$

D. $a^2+b^2=1$

Answer: C

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50. Tangent to the curve $x^2=2y$ at the point $\left(1, \frac{1}{2}\right)$ makes with the X-axes an angle of

A. 0°

B. 30°

C. 45°

D. 60°

Answer: C

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51. If the tangent at any point on the curve $y = x^5 + 5x - 12$ makes an angle θ with the x - axis then θ is

A. acute

B. abtuse

C. reflexive

D. a vector

Answer: A

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

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

B. $\frac{2}{\sqrt{4}}$

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

D. $\sqrt{2}$

Answer: C

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53. The tangent to curve $y = f(x)$ is perpendicular to X-axes if

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

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

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

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

Answer: D

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54. If normal the curve y=f(x) is parallel to X-axis, then correct statement is

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

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

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

D. $\frac{d^2x}{dy^2} = -\frac{dy}{dx}$

Answer: B

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55. If the slope of the curve $y = \frac{ax}{b-x}$ at the point (1, 1) is 2, then

A. $(1, -2)$

B. $(-1, 2)$

C. $(1, 2)$

D. $(-1, -2)$

Answer: C

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56. The equation of the tangent to the curve $y = \sqrt{9 - 2x^2}$ at the point where the ordinate & the abscissa are equal is

A. $2x + y - 3\sqrt{3} = 0$

B. $2x + y + 3\sqrt{3} = 0$

C. $2x - y - 3\sqrt{3} = 0$

D. $x + 2y + 3\sqrt{3} = 0$

Answer: A

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57. The tangent to the curve $5x^2 + y^2 = 1$ at $\left(\frac{1}{3}, -\frac{2}{3}\right)$ passes through the point

A. $(0, 0)$

B. $(1, -1)$

C. $(-1, 1)$

D. $(1, 1)$

Answer: D

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58. If the normal to the curve $y = f(x)$ at the point $(3, 4)$ makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3) =$

A. (-1)

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

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

D. 1

Answer: D

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

A. $(-a, ab)$

B. $\left(a, \frac{a}{b}\right)$

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

D. $(0, b)$

Answer: D

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60. If the line $y = 2x$ touches the curve $y = ax^2 + bx + c$ at the point where x=1 and the curve passes through the point (-1,0), then

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

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

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

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

Answer: A

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

A. $n=2$ only

B. $n=\ -3$ only

C. any real number n

D. $n=2-3i$

Answer: C

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62. The actue angle between the tangent at those points on the curve $y=(x+1)(x-3)$ where it meets the X-axes is

A. $\tan^{-1}\left(\frac{15}{8}\right)$

B. $\tan^{-1}\left(\frac{8}{15}\right)$

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

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

Answer: B

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63. Equation of the tangent to the curve $y = 2x^2 + 5x$, at the point where the line $y = 3$ cuts the curve in the first quadrant , is

A. $14x - 2y - 1 = 0$

B. $14x - 2y + 13 = 0$

C. $14x + 2y - 1 = 0$

D. $2x - 14y - 1 = 0$

Answer: A

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64. The angle between the tangents to the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the points $(a, 0)$ and $(0, b)$ is

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

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

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

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

Answer: B

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65. Equation of the tangent to the curve $y = 1 - 2^{x/2}$ at the point of intersection with the Y-axes is

A. $2y - x \log 2 = 0$

B. $2y + x = 0$

C. $2y + x \log 2 = 0$

D. $x + 2y = \log 2$

Answer: C

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66. If the curve $y = px^2 + qx + r$ passes through the point $(1, 2)$ and the line $y = x$ touches it at the origin, then the values of p, q and r are

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

B. $(1, 1, 0)$

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

D. $(0, 1, 1)$

Answer: B

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67. Any tangent to the curve $y = 3x^7 + 5x + 3$

A. is parallel to X-axis

B. is parallel to Y-axis

C. makes an acute angle with the X-axis

D. makes an abtuse angle with the X-axis

Answer: C

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68. For the curve $x = t^2 - 1, y = t^2 - t$, the tangent is parallel to X-axis at the point where

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

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

C. $t = 0$

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

Answer: D

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69. For the curve $x = 3\cos\theta, y = 3\sin\theta, 0 \leq \theta \leq \pi$, the tangent is parallel to the x-axis, where $\theta =$

A. $\theta = \pi$

B. $\theta = 0$

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

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

Answer: D

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70. Find the point on the curve $9y^2 = x^3$, where the normal to the curve makes equal intercepts on the axes.

A. $(3, \sqrt{3})$

B. $\left(-4, \frac{8}{3}\right)$

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

D. $(3, -\sqrt{3})$

Answer: C

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

A. $x - y = 0$

B. $x + y = 0$

C. $y = 0$

D. $x = 0$

Answer: B

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

A. $(2, -7)$

B. $(-2, 7)$

C. $(-2, -7)$

D. $(2, 7)$

Answer: A

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73. Line $x + y = 2$ is tangent to the curve $x^2 = 3 - 2y$

at the point

A. $(1, 1)$

B. $(-1, 1)$

C. $(\sqrt{3}, 0)$

D. $(3, -3)$

Answer: A

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74. The point of the curve $y^2 = 2(x - 3)$ at which the normal is parallel to the line $y - 2x + 1 = 0$ si

A. $(5, 2)$

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

C. $(5, -2)$

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

Answer: C

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75. Find the equation of the tangent to the curve $y = x - \sin x \cos x$ at $x = \frac{\pi}{2}$

A. $3x - y - 2\pi = 0$

B. $x - 3y - 2\pi = 0$

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

D. $x - 3y + 2\pi = 0$

Answer: C

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76. Equation of the tangent to the curve $x^n - y^n = 0$ at $(2, 2)$ is

A. $ny + x - 4 = 0$

B. $x = 2n$

C. $y = 2n$

D. $y = x$

Answer: D

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77. Equation of the tangent to the curve $y = e^x$ at $(0, 1)$ is

A. $x = 0$

B. $y = 1$

C. $x + y = 1$

D. $x - y + 1 = 0$

Answer: D

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78. Equation of the tangent to the curve $y = \log x$ at $(1, 0)$ is

A. $x - y - 1 = 0$

B. $x + y = 1$

C. $x = 1$

D. $y = 0$

Answer: A

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79. 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. $x + y = a + b$

B. $x - y = a - b$

C. $bx - ay = 0$

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

Answer: D

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80. If the equation of the tangent to the curve $y = ax^2 + b$ is $y = 4x - 5$, then

A. $a + b = 2$

B. $a(5 + b) = 4$

C. $2a = b$

D. $a = 2b$

Answer: B

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81. Any tangent to the curve $y = 1 - x^5 - 8x$ makes with the X-axis

A. an acute angle

B. an obtuse angle

C. a right angle

D. a zero angle

Answer: B

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82. Angle made by the tangent to the curve $y = x^2 + 4x - 17$ at $(2, -5)$, with the X-axis , is

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

B. $\tan^{-1} 8$

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

D. $-\tan^{-1} 5$

Answer: B

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83. Point on the curve $x^2 = 4y^3$, the tangent at which is prependicular to the line $3x + y = 1$ is

A. $(2, 1)$

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

C. $(-2, 1)$

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

Answer: A

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84. Point on the curve $y = x^4 + 5$, the normal at which is prependicular to the line $4x - y - 1 = 0$ is

A. $(2, 21)$

B. $(0, 5)$

C. $(- 1, 6)$

D. $(1, 6)$

Answer: D

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85. Equation of tangent to the curve $x = a.\,e^{-y/b}$, at the point where it cuts the X-axis, is

A. $ay + bx = 0$

B. $ay + bx = 1$

C. $ay + bx = 2ab$

D. $ay + bx = ab$

Answer: D

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86. Equation of normal to curve $y = b.\, e^{-\frac{x}{a}}$, where it cuts the y-axis, is

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

B. $ax - by + b = 0$

C. $ax - by + b^3 = 0$

D. $ax - by = 0$

Answer: A

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87. Equation of normal to the curve $y = ax^3 + bx^2 + c$, where the curve crosses the Y-axis, is

A. $y+c=0$

B. $y-c=0$

C. $x=0$

D. $y=0$

Answer: C

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

A. $\frac{1}{4}$

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

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

D. 1

Answer: B

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89. The point(s) on the curve $y^3 + 3x^2 = 12y$ where the tangent is vertical, is(are) ?? $\left(\pm\frac{4}{\sqrt{3}}, -2\right)$ (b) $\left(\pm\sqrt{\frac{11}{3}}, 1\right)$ $(0, 0)$ (d) $\left(\pm\frac{4}{\sqrt{3}}, 2\right)$

A. $\left(\pm\frac{1}{\sqrt{3}}, 2\right)$

B. $\left(\pm\frac{11}{\sqrt{3}}, 2\right)$

C. $(0, 0)$

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

Answer: D

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90. The curve $x^4 + 2xy^2 + y^2 + 3x + 3y = 0$ cuts the X-axis at $(0, 0)$ at an angle of

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

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

C. π

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

Answer: D

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91. 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 find $a and b$?

A. $(1, 2)$

B. $(1, -2)$

C. $(-1, 2)$

D. $(-1, -2)$

Answer: B

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92. The equation of normal to the curve $y = 3x^2 4x - 5$ at $(1, 2)$ is

A. $10x - y - 8 = 0$

B. $x + 10y - 21 = 0$

C. $10x + y + 8 = 0$

D. $x + 10y + 21 = 0$

Answer: B

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93. The equation of the tangent to the curve $y = 4xe^x$ at $\left(-1, \frac{-4}{e}\right)$ is

A. $ey + 4 = 0$

B. $4x - ey - 8 = 0$

C. $4x - ey = 0$

D. $ey - 4 = 0$

Answer: D

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94. The equation of tangent to the curve given by $x = 3\cos\theta, y = 3\sin\theta, at\theta = \frac{\pi}{4}$ is

A. $x + y = \sqrt{2}$

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

C. $x + y = 3\sqrt{2}$

D. $x + 3y = 3\sqrt{2}$

Answer: C

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95. If the equation of the tangent to the curve $y^2 = ax^3 + b$ at point $(2, 3) is y = 4x - 5$, then find the values of $a and b$.

A. $3, \ -5$

B. $6, \ -5$

C. $6, 15$

D. $6, \ -15$

Answer: D

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96. The equation of normal to the curve $x^2 + y^2 = r^2$ at $p(\theta)$ is

A. $x \sin\theta - y \cos\theta = 0$

B. $x \sin\theta + y \cos\theta = 0$

C. $x \cos\theta - y \sin\theta = 0$

D. $x \cos \theta + y \sin \theta = 0$

Answer: A

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97. If displacement S at time t is $S = 10t - 5t^2$, then velocity at time t is

A. $-10t$

B. $10(1 - t)$

C. $10(t - 1)$

D. $10t$

Answer: B

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98. If displacement S at time t is $S = -t^3 + 3t^2 + 5$, then velocity at time $t = 2$ sec is

A. 3 units/ sec

B. 6 units/sec

C. 12 units/sec

D. 0

Answer: D

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99. If $S = 9t - \frac{t^3}{3}$, the particle to rest after time $t =$

A. 1 sec

B. 2 sec

C. 3 sec

D. 4 sec

Answer: C

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100. If $S = t^3 - 64t - 8$, then acceleration vanishes at time $t =$

A. 2 sec

B. 3 sec

C. 4 sec

D. 1 sec

Answer: A

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101. If $S = 16 + (192)t - t^3$, then distance travelled by the particle before coming to rest is

A. 1040 units

B. 520 units

C. 260 units

D. 2080 units

Answer: A

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102. If $S = t^3 - 3t^2 + 5$, then acceleration, when velocity becomes zero is

A. $2\text{units} / \sec^2$

B. $6\text{units} / \sec^2$

C. $4\text{units} \quad / \sec^2$

D. $8\text{units} \quad / \sec^2$

Answer: B

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103. The distances moved by a particle in time t seconds is given by $s = t^3 - 6t^2 - 15t + 12$. The velocity of the particle when acceleration becomes zero, is

A. $15\text{units}/\text{sec}$

B. $-27\text{units}/\text{sec}$

C. $27\text{units}/\text{sec}$

D. $-15\text{units}/\text{sec}$

Answer: B

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104. If $S = 2 + 3t - t^2 + t^3$, then velocity when acceleration is zero is

A. $10\text{units}/\text{sec}$

B. 0

C. $\frac{8}{3}\text{units}/\text{sec}$

D. $-3\text{units}/\text{sec}$

Answer: C

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105. If displacement S at time t is $S = t^3 - 3t^2 - 15t + 12,$ then acceleration at time $t = 1 \sec$ is

A. $6 \text{units} / \sec^2$

B. $-6 \text{units} / \sec^2$

C. 0

D. $\text{units} / \sec^2$

Answer: C

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106. If displacement S at time t is $S = 2t^3 + 6t$, then velocity is always

A. increasing

B. decreasing

C. constant

D. flutuating

Answer: B

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107. If $S = \frac{1}{3}t^3 - 4t^2 + 12t$, then distance travelled by the particle before it first comes to rest is

A. $\frac{32}{3}$ units

B. 32 units

C. $\frac{64}{3}$ units

D. 64 units

Answer: A

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108. If $S = 6t^2 - t^3$, then the body comes to rest after time $t =$

A. 2 sec

B. 3 sec

C. 4 sec

D. 8 sec

Answer: C

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109. If $S = t^4 - 5t^2 + 8t - 3$, then initial velocity of the particle is

A. 0

B. 8 units / sec

C. 6 units/sec

D. 5 units / sec

Answer: B

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110. If $S = 4t^3 - 3t^2 + 2$, then acceleration is $42\text{units}/\text{sec}^2$ at the time t=

A. 1 sec

B. 2 sec

C. 4 sec

D. 8 sec

Answer: B

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111. If $S = 2t^3 - 4t^2 + 12t,$ then distance travelled during the time -interval $[0, 1]$ is

A. 4 units

B. 9 units

C. 8 units

D. 10 units

Answer: D

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112. If $S = 3t^3 + 9t^2 + 2t + 7$, then distance travelled by the particle during the first second of its motion is

A. 7 units

B. 21 units

C. 14 units

D. 28 units

Answer: C

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113. A stone thrown certically upwards rises S ft in t seconds where $S = (112)t - (16)t^2$. The maximum height reached by the stone is

A. 192 ft

B. 190 ft

C. 196 ft

D. 392 ft

Answer: C

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114. A stone is projected vertically upwards. Its height h at time t sec is $h = (80)t - (16)t^2$. The velocity with which it hits the ground is

A. 80 units/ sec

B. 60 units /sec

C. 16 units /sec

D. 32 units / sec

Answer: A

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115. A stone is project vertically upward from the top of a tower of height 60 m. The stone moves according to the law $S = (10)t - 5t^2$, where S is in meters and t in second The maximum height , reached by the stone , from the ground , is

A. 60 m

B. 55 m

C. 65 m

D. 50 m

Answer: C

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116. A stone is thrown up vertically and the height x ft it reached in t seconds is $x = (80)t - (16)t^2$. It reached the maximum height in time $t =$

A. 2 seconds

B. 3 seconds

C. 2.5 seconds

D. 1.5 seconds

Answer: C

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

A. 64 ft

B. 100 ft

C. 112 ft

D. 58 ft

Answer: B

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118. If $S = 9t - 3t^3$, then maximum velocity is

A. 0

B. -9 units / sec

C. 9 units/ Sec

D. 10 units /sec

Answer: C

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119. If $S = 16 + 64t - t^3$, then maximum velocity is

A. 16 units / sec

B. 32 units / sec

C. 64 units /sec

D. 128 units /sec

Answer: C

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120. Displacement x at time t is $x = t - t^3$. If v is the velocity and a the acceleration at time t, then :v =

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

B. $1 + \frac{1}{2}at$

C. ax

D. $a + \frac{1}{2}t$

Answer: B

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121. If displacement x at time t is $x = \sqrt{1 + t^2}$, then acceleration is

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

B. $\frac{1}{x^2}$

C. $\frac{1}{x^3}$

D. x^3

Answer: C

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122. If, at time t, x is the displacement and v the velocity, then acceleration at that time is

A. $v\frac{dv}{dt}$

B. $\frac{d^2v}{dx^2}$

C. $v\frac{dv}{dx}$

D. $x\frac{dv}{dx}$

Answer: C

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123. If $S = t^n$, where $n \neq 0$, then velocity equal acceleration at time $t = 3$ sec if : n=

A. 1

B. 2

C. 3

D. 4

Answer: D

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124. The law of motion of a particle is $S = t^n$, where $n \geq 3$.If v is the velocity and a the acceleration at time t, then $\frac{aS}{v^2} =$

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

B. $\frac{n-1}{n}$

C. $\frac{n}{n-1}$

D. $\frac{n-2}{n}$

Answer: B

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125. If dispolacement x at time t is $x = a\cos\omega t - b\sin\omega t$, where ω is a constant, then: acceleration=

A. $\omega^2 x$

B. ωx

C. $-\omega x$

D. $-\omega^2 x$

Answer: D

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126. If $s = e^t$ (sin t - cot t) is the equation of motion of a moving particle, then acceleration at time t is given by

A. $2e^t(\cos t + \sin t)$

B. $2e^t(\cos t - \sin t)$

C. $e^t(\cos t - \sin t)$

D. $e^t(\cos t + \sin t)$

Answer: A

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127. If a particle moving along a line follows the law $t = as^2 + bs + c$, then the retardation of the particle is proportional to

A. velocity

B. squre of velocity

C. cube of velocity

D. displacement

Answer: C

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128. The equation of motion of particle is $S = at^2 + bt + c$.If the displcement after 1 sec is 20 m, velo0city after 2 sec is 30 m/ sec and the acceleration is $10m / se^2$, then

A. $a+c=2b$

B. $a+c=b$

C. $a-c=b$

D. $a+c=3b$

Answer: B

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129. If the velocity of a body moving in a straight line is proportional to the square root of the distance traversed, then it moves with

A. variacble acceleration

B. acceleration propertional to velocity

C. constant acceleration

D. constant velocity

Answer: C

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130. The equations of motion of a particle $P(x, y)$ on a plane are given by $x = 4 + r.\cos t, y = 6 + r.\sin t$, where t is time and r is constant . Its velocity at time t is

A. $-\cot(t)$

B. $-\tan(t)$

C. r

D. $r.\tan(t)$

Answer: A

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131. Area A of a blot of increasing in such a way that, after t second , $A = 3t + t^3$. Rate at which the blot is expanding after 2 seconds is

A. 6 sq. u. /sec

B. 15 sq.u./sec.

C. 9sq. u/sec

D. 18 sq . u /sec

Answer: B

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132. A change Q flowing through a conductor , beginning with time $t=0$, is given by $Q=3t^2+2t+$. If the intensity of the current is the rate of change of Q w.r.t. t, then the intensity at the end of the fifth second is

A. $\frac{1}{23}$ units

B. 23 units

C. $\frac{1}{32}$ units

D. 32 units

Answer: D

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133. If the rate of change in $y = \frac{x^3}{3} - x^2 - 30x$ is 5 times the rate of change in x, then :x =

A. $-5, 7$

B. $5, \ -7$

C. $5, 7$

D. $-5, \ -7$

Answer: A

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134. If the rate of change in $y = 3x^3 + \frac{9}{2}x^{+2} - 8x$ is twice the rate of change in x, then: x=

A. $2, \ -5$

B. $-2, 5$

C. $\frac{2}{3}, \ -\frac{5}{3}$

D. $-\frac{2}{3}, \frac{5}{3}$

Answer: C

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135. If the rate change in $y = 2x^3 + 3x^2 - 30x + 8$ is 6 times the rate of change in x , then :x=

A. $1, 5$

B. $-1, 5$

C. $2, \ -3$

D. $2, 3$

Answer: C

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136. If the rate of decrease of $\frac{x^3}{3} - 9x + 5$ is 7 times the rate of decrease of x then : x=

A. ± 4

B. ± 2

C. ± 3

D. 0

Answer: A

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137. The point on the circle $x^2 + y^2 = 8$ at which the abscissa and ordinate increase at the same rate is

A. $(-2, 2)$

B. $(\sqrt{2}, \sqrt{6})$

C. $(\sqrt{6}, \sqrt{2})$

D. $(2, 2)$

Answer: A

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138. The point on the parabola $y^2 = 4x$ at which the abscissa and ordinate change at the same rate is

A. $(2, 2\sqrt{2})$

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

C. $(1, 2)$

D. $(4, 4)$

Answer: C

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139. The pont on the parabola $x^2 = 16y$ at which abscissa changes twice as fast as ordinate is

A. $(4\sqrt{2}, 2)$

B. $(-4\sqrt{2}, 2)$

C. $(8, 4)$

D. $(4, 1)$

Answer: D

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140. The point on the ellips $9x^2 + 16y^2 = 400$ at which the abscissa and ordinate decrease at the same rate is

A. $\left(\frac{16}{3}, -3\right)$

B. $(4, 3)$

C. $(-4, 3)$

D. $(-4, -3)$

Answer: A

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141. A point P moves along the curve $y = x^3$. If its abscissa is increasing at the rate of 2 units/ sec, then the rate at which the slop of the tangent at P is increasing when P is at $(1, 1)$, is

A. 3 units/ sec

B. 12 units/sec

C. 24 units/sec

D. 8 units/sec

Answer: B

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142. If the radius of the circle changes at the rate of $0.04cm/\sec$, then the rate of change of its area, when radius is 10 cm, is

A. $8\pi cm^2/\sec$

B. $0.8\pi cm^2/\sec$

C. $0.4cm^2/\sec$

D. $4\pi cm^2/\sec$

Answer: B

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143. If the radius of a circle changes at the rate of $0.2cm/\sec$, then , when the radius is 20 cm, its area changes at the rate of

A. $8\pi cm^2/\sec$

B. $0.8cm^2/\sec.$

C. $80\pi cm^2.$

D. $0.8cm^2/\sec.$

Answer: A

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144. If the area of a circle change at the rate of $0.8cm^2/\sec$, then, when the radius is 4 cm , it circumference changes at the rate of

A. $2cm/\sec$

B. $0.2cm/\sec$

C. $0.4cm/\sec.$

D. $0.8cm/\sec$

Answer: B

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145. If the circumference of a circle changes at rate of $0.2cm/\sec$, then , when the radius is 8 cm , its area is changing at the rate of

A. $0.8cm^2/\sec$

B. $0.4cm^2/\sec$

C. $1.6cm^2/\sec$

D. $3.2cm^2/\sec$

Answer: C

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146. If the circumference of a circle changes at the rate of $0.7\pi cm / \sec$, then, when the radius is 5 cm, the radius is changing at the of

A. $0.7 cm / \sec.$

B. $7 cm / \sec$

C. $3.5 cm / \sec$

D. $0.35 cm / \sec$

Answer: D

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147. If the area of a circle changes at the rate of $2\pi cm^2 / \sec$, then, when the radius is 10cm, the radius is changing at the rate of

A. $10cm / \sec$

B. $0.1cm / \sec$

C. $1cm / s.$

D. $0.01cm / \sec.$

Answer: B

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148. When a circle oil drop expands on water, its area increase at the rate of $40\pi cm^2 / \sec$ When the radius is 5 cm, it is increasing at the rate of

A. $4cm / \sec$

B. $8cm / \sec$

C. $2cm / \sec$

D. $16cm / \sec$

Answer: A

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149. If the diameter and area of a circle change ta the same rate, then the radius of this circle is

A. $\frac{1}{\pi}$ units

B. $\frac{\pi}{2}$ units

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

D. $\frac{8}{\pi}$ units

Answer: A

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150. Radius of a circular disc decreases at a uniform rate of $0.25cm / \sec$. When the radius is 25 cm, the area of the disc is changing at the rate of

A. $1.25\pi cm^2 / \sec$

B. $-1.25\pi cm^2 / \sec.$

C. $-12.5\pi cm^2 / \sec.$

D. $12.5\pi cm^2 / \sec.$

Answer: C

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151. Area of circular blot of ink is increasing at the rate of $2cm^2 / \sec$. When the area of the blot is $4cm^2$, its radius is increasing at the rate of

A. $\frac{1}{2\pi} cm / \sec$

B. $\frac{1}{2\sqrt{\pi}} cm / \sec.$

C. $\frac{1}{2\pi^2} cm / \sec.$

D. $\frac{\pi}{\sqrt{2}} cm / \sec.$

Answer: B

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152. A stone dropped into a pond of still water sends out concentric circular waves of water,from the point of disturbance, at the rate of 4 cm/sec. When the radius of the wave-ring is 15 cm, the disturbed area is changing at the rate of s

A. $12\pi cm^2 / \sec$

B. $20\pi cm^2 / \sec$

C. $1.2\pi cm^2 / \sec$

D. $0.12\pi cm^2 / \sec.$

Answer: B

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153. A stone is dropped into a quiet pond and waves spread in the form of concentric circles outward from the point where it strikes at speed of 4 inch /sec. When the radius of the wave- ring is 3 ft , the enclosed area is increasing at the rate of

A. $2\pi sq.\ ft.\ /\text{sec.}$

B. $\pi sq.\ ft/\text{sec.}$

C. $3\pi sq.\ ft.\ /\text{sec.}$

D. $4\pi sq.\ ft/\text{sec.}$

Answer: A

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154. A stone dropped into a pond of still water sends out concentric circular waves of water , from the point of disturbance, at the rate of 50 cm/sec. When the radius of the wave-ring is 75 metres, the rate of increase of its circumference and area are respectively

A. $2\pi m / s, 75m^2 / s$

B. $\pi m / s, 75\pi m^2 / s$

C. $2\pi m / s, 50\pi m^2 / s$

D. $\pi m^2 / s, 75\pi m / s$

Answer: B

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155. Sides of a sqare are inceasing at the rate of $0.5cm / \text{sec}$. When the side is 10 cm long its area is increasing at the rate of

A. $100cm^2 / \text{sec}$

B. $0.10cm^2 / \sec$

C. $10cm^2 / \sec.$

D. $0.10cm^2 / \sec.$

Answer: C

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156. A square plate is contracting at the uniform rate of $2cm^2 / \sec.$ If side fo the square is 16 cm long, then the rate of decrease of its perimeter is

A. $25cm / \sec.$

B. $-15cm / \sec.$

C. $0.25cm/\sec.$

D. $-0.25cm/\sec.$

Answer: D

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157. Perimeter of square increases at the rate of $0.4cm/\sec.$ When the side is 20 cm, its area increases at the rate of

A. $0.4cm^2/\sec.$

B. $-25cm^2/\sec.$

C. $0.2cm^2/\sec.$

D. $4cm^2 / \sec.$

Answer: D

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158. If the perimeter and area of a square change at the same rate, then the side of the square is

A. 2 units

B. 4 units

C. 6 units

D. 3 units

Answer: A

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159. Perimeter of an isoscels triangle is $100cm$. If its base increase at the rate of $2cm / \min$, the, when base is 30cm , its altitude is changing at the rate of

A. $2.5cm \min$.

B. $-0.25cm / \min$.

C. $25cm / \min$.

D. $-\sqrt{2.5}cm / \min$.

Answer: D

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160. Each side of an equilateral triangle increases ta a uniform rate of $0.5 cm / \sec$. When each side is 40 cm , its area is increasing at the rate of

A. $5\sqrt{3} cm^2 / \sec.$

B. $10\sqrt{3} cm^2 / \sec$

C. $20\sqrt{3} cm^2 / \sec.$

D. $15\sqrt{3} cm^2 / \sec$

Answer: B

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161. Ie the side of a cube increases at the eate of $0.04 cm / \sec$, then , when the side is 6 cm , surface area of the cube is increasing at the rate of

A. $2.88 cm^2 / \sec.$

B. $2.80 cm^2 / \sec.$

C. $0.288 cm^2 / \sec.$

D. $28.8 cm^2 / \sec.$

Answer: A

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162. If the side of a cube decreases at the rate of $0.02cm/\sec$, then, when the side is 10 cm , volume of the cube decreases at the rate of

A. $0.6cm^3/\sec.$

B. $6cm^3/\sec.$

C. $60cm^3/\sec.$

D. $0.06cm^3/\sec.$

Answer: B

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163. If the volume and side of a cube are changing at the same rate , then side of the cube is

A. $\sqrt{3}$ units

B. $2\sqrt{3}$ units

C. $3\sqrt{3}$ units

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

Answer: D

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164. If the surface area of a cube increases at the rate of $0.6cm^2/\sec$, then, when the side is 4 cm , volume of the cube is increasing at the rate of

A. $6c. \, c/\text{sec.}$

B. $60c. \, c/\text{sec.}$

C. $0.6c. \, c/\text{sec.}$

D. $0.06c. \, c/\text{sec.}$

Answer: C

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165. If the volume of a cube increases at the of $1c. \, c/\text{sec}$, then, when the side is $\sqrt{3}cm$ diagonal of the cube is increasing at the rate of

A. $\sqrt{3}cm / \sec$

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

C. $2cm / \sec$

D. $1/3\sqrt{3}cm / \sec.$

Answer: D

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166. A square plate contract at the uniform rate of $0.01cm / \sec$, then, when the radius is 20 cm , vloume of the sphere is increasing at the rate of

A. $1.6\pi c.\ c / \sec.$

B. $0.16\pi c.\ c.\ /\sec.$

C. $16\pi c.\ c.\ /\sec.$

D. $8\pi c.\ c.\ /\sec.$

Answer: C

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167. If the surface area of a sphere increases at the rate of $2sq.\ ft.\ /\sec,$ then , when the radius is 6 ft. its volume is increasing at the rate of

A. $2cu.\ Ft.\ /\sec.$

B. $6cu.\ Ft.\ /\sec.$

C. $3cu. Ft/\sec.$

D. $-3cu. Ft. /\sec.$

Answer: B

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168. If the volume of sphere changes at the rate of $140cm^3/\sec,$ then, when the radius is $70cm,$ its surface area is increasing at the rate of

A. $2cm^2/\sec.$

B. $1cm^2/\sec.$

C. $4cm^2/\sec.$

D. $3cm^2/\sec.$

Answer: C

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169. If a spherical soap bubble expands at the rate of $2/\sec,$ then , when the radius is $10cm,$ its diamater is increasing at the rate of

A. $100\pi cm/\sec.$

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

C. $\frac{\pi}{100}cm/\sec$

D. $\frac{100}{\pi}cm/\sec.$

Answer: B

View Text Solution

170. If air is leaking from a spherical balloon at the rate of $2/\sec$, then, when the radius is $10cm$, its surface area is decreasing at the rate of

A. $\frac{2}{5}cm^2/\sec.$

B. $\frac{3}{5}cm^2/\sec.$

C. $\frac{4}{5}cm^2/\sec.$

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

Answer: A

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171. If V denotes the volume and S is the surface area of a sphere. If radius of sphere is 2 cm, then the rate of change of V w.r.t. S is

A. 1

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

172. Water is poured into an inverted cone of semi-vertical angle 30° at the rate of $2cu. ft / \min$ .When the depth of water in the cone is 1 foot, the surface of water in the cone is rising at the rate of

A. $\frac{\pi}{6} ft. / \min$.

B. $\frac{6}{\pi} ft. / \min$.

C. $6\pi ft. / \min$

D. $\frac{2}{\pi} ft. / \min$.

Answer: B

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173. Whater is poured into an inverted cone of semi-vertical angle 45° at rate of $2cu.$ in . /min .The rate at which the depth of water in the cone is increasing when the depth is 4 in. is

A. $\frac{1}{8\pi}$ in . /min.

B. $\frac{8}{\pi}$ in. /min.

C. $\frac{\pi}{8}$ in. /min.

D. 8π in. /min.

Answer: A

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174. An inverted cone of filter paper, with vertical angle 30°, is filled with water which runs out at the rate of $3cu. Ft. / \min$. When the depth is 3 ft. 6 in., level of water in the cone is failling at the rate of

A. $\frac{6}{7\pi} ft. / \min$.

B. $\frac{7\pi}{6} ft. / \min$.

C. $\frac{36}{49\pi} ft. / \min$.

D. $\frac{49\pi}{36} ft. / \min$.

Answer: C

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175. Sand is falling onto the ground at the rate of 18 cubic m/sec. And is forming a heap in the shape of a cone . If its height is twice the base-radius, then the rate at which the height is increasing when the height of the cone is 6 m is

A. $\frac{4}{\pi}m/\sec$

B. $\frac{3}{\pi}m/\sec$

C. $\frac{1}{\pi}m/\sec$

D. $\frac{2}{\pi}m/\sec$

Answer: D

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176. Water is running into an inverted cone at the rate of $270 dm^3 / \min$. The radius of the cone is equal to the depth of water in it .When the water is 18 dm deep, water level is rising at the rate of

A. $\frac{5}{6\pi} dm / \min$.

B. $\frac{30}{\pi} dm / \min$.

C. $\frac{6}{5\pi} dm / \min$.

D. $\frac{1}{30\pi} dm / \min$.

Answer: A

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177. Water is being poured into an open cylindrical can of radius 2ft. At the rate of $6cu.\ ft / \min$. The depth of water in the can is increasing at the rate of

A. $\frac{3\pi}{2} ft. / \min$.

B. $\frac{2}{3\pi} ft. / \min$.

C. $\frac{3}{2\pi} ft. / \min$.

D. $\frac{2\pi}{3} ft. / \min$.

Answer: C

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178. Base radius of a cylindrical vessel , full of oil is 30 meters. Oil is drawn from it at the rate of $27000m^3 / \min$. Rate at which level of oil in the vessel is falling is

A. $\frac{30}{\pi}m / \min$.

B. $\frac{\pi}{30}m / \min$.

C. $30\pi m / \min$.

D. $\frac{27}{\pi}m / \min$.

Answer: A

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179. Oil is being filled in a cylindrical tank of diamater $18cm$. If the amount of oil in the tank is increasing at the rate of $324\pi/\min$, then the height of oil is increasing at the rate of

A. $2cm/\sec.$

B. $3cm/\sec.$

C. $4cm/\sec.$

D. $1cm/\sec.$

Answer: C

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180. Slant height of a cone is fixed at $7cm$.If its height increases at $0.6cm/\sec$, then, when the height is $4cm$, its volume is increasing at the rate of

A. $\frac{5}{\pi}$ cc/sec

B. 5π cc/sec

C. $\frac{1}{5\pi}$ cc/sec

D. $\frac{\pi}{5}$ cc/sec

Answer: D

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181. A ladder of length $17m$ rests with one end agains a vertical wall and the other on the vessel ground. If the lower end slips away at the rate of $1ms^{-1}$, then when it is $8m$ away from the wall, its upper end is coming down at the rate of

A. $\frac{5}{8}m/\text{sec.}$

B. $\frac{8}{15}m/\text{sec.}$

C. $\frac{5\pi}{8}m/\text{sec.}$

D. $\frac{15}{8}m/\text{sec.}$

Answer: B

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182. A ladder $5m$ long rests against a vertical wall. If its top slides down at the rate of $10cm/\sec$, then, when the foot of the ladder is $4m$ away from the wall, the angle between the floor and the ladder is decreasing at the rate of

A. $\frac{\pi}{4}\text{radians}/\sec.$

B. $\frac{4}{\pi}\text{radians}/\sec.$

C. $(0.025)\text{radians}/\sec.$

D. $\frac{\pi}{6}\text{radians}/\sec.$

Answer: C

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183. A ladder 10 m long leans against a house. When its foot is 6 m from the house and moving away at the rate of $0.5m/\sec.$, its top is sliding down at the rate of

A. $\frac{3}{8}m/\sec.$

B. $\frac{8}{3}\frac{m}{\sec}.$

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

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

Answer: A

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184. A ladder 60 ft long rests against a vertical wall on a level plane. Its foot is slipping away from the wall . If when the foot is x.ft . From the wall the top and the foot are moving at the same rate , then :x=

A. 30

B. $20\sqrt{2}$

C. 35

D. $30\sqrt{2}$

Answer: D

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185. A rod 25 ft. Long always has its ends A and B on the X-andY-axes respectively .If A is at 15 ft.from the origin and is moving at the rate of $0.2 ft. / \text{sec}$, then the area of the triangle formed by the rod with axes is changing at the rate of

A. $3 ft. / \text{sec.}$

B. $0.875 ft. / \text{sec.}$

C. $2 ft. / \text{sec.}$

D. $-2 ft. / \text{sec.}$

Answer: B

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186. A man of height 150 cm walks at the rate of $75 cm / \sec$, towards a lighted lamp-post which is 450 cm high. When he is $360 cm$ away from the lamp-post , his shadow is shortening at the rate of

A. $37.5 cm / \sec$

B. $75.3 cm / \sec.$

C. $57.3 cm / \sec.$

D. $3.75 cm / \sec.$

Answer: A

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187. A street lamp is 6 m above the ground . A man 1.8 m tall walks directly away from it at the rate $1.2m/\sec.$ When hye is 9 m away, his shadow is lengthening at the rate of

A. $\frac{9}{7}m/\sec.$

B. $\frac{18}{35}m/\sec.$

C. $0.1835m/\sec.$

D. $0.3518m/\sec.$

Answer: B

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188. A kite is flying at a height of 40 meters .The boy who is flying it is carrying it at the rate of $3m / \sec.$ Height of the kite remains the same and the string is staight (taut).The rate at which the string is being paid out , when itys length is 50 meters , is

A. $\frac{81}{25} m / \sec.$

B. $\frac{9}{5} m / \sec.$

C. $\frac{5}{9} m / \sec.$

D. $\frac{25}{81} m / \sec.$

Answer: B

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189. A boy is flying a kite of a height of 40 ft. If the kite moves horizontally away from the boy at the rate of $5 ft. / \sec.$, paid out at the rate of

A. $5 ft, / \sec.$

B. $4 ft. / \sec.$

C. $3 ft. / \sec.$

D. $2 ft. / \sec.$

Answer: C

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190. An aerplane at an altitude of 400 metres, flying horizontally with a speed of $250 m / \sec$, passes directly the observer, it is approaching him at the rate of

A. $100 m / \sec.$

B. $200 m / \sec$

C. $300 m / \sec.$

D. $150 m / \sec.$

Answer: D

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191. A man on the tower 15 metres above the water pulls in a rope, attached to a boat, at the rate of $0.8m/\text{sec}$ .When the boat is $8m$ from the tower, it is approaching the river bank at the rate of

A. $17m/\text{sec.}$

B. $1.7m/\text{sec.}$

C. $0.7m/\text{sec.}$

D. $7m/\text{sec.}$

Answer: B

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192. A man on a wharf 40 metres above the water pulls in a rope, attached to a boat, at the rate of $3m/\text{sec}.$ When there is still 50 metres of rope out, the boat is approaching the shore at the rate of

A. $5m/\text{sec}.$

B. $4m/\text{sec}.$

C. $3m/\text{sec}.$

D. $2m/\text{sec}.$

Answer: A

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193. Pessure P and volme V of a certain mass of a gas, at contant temperature, are given by $pv = 100$. When the volume is 25 and inccreasing at the rate of $0.25/\sec$, pressure is changing at the rate of

A. $4\text{Dynes}/cm^2$

B. $0.4\text{Dynes}/\sec^2$

C. $-0.4\text{Dynes}/cm^2$

D. $44\text{Dynes}/cm^2$

Answer: C

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194. A glass vessel is so constructed that when the depth of the liquid in is $x cm$, the volume of the liquid is $\left(3x^2 - \frac{x^3}{3}\right) cm^3$.Liquid is poured itno the vessel at such a the rate of $2cm / \sec$, Tthen the liquid is being poured in the vessel at tjhe rate of

A. $81 / \sec.$

B. $18 / \sec.$

C. $9 / \sec.$

D. $8 / \sec.$

Answer: B

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195. Volume of water in a trough is $x(2x^2 + 2x + 5)cm^3$ when the depth ter is xcm.Water is poured into the trough at the rate of $100/\sec$. When the depth of water in it is $5cm$, water level is rising at the rate of

A. $\frac{4}{7}cm/\sec.$

B. $\frac{7}{4}cm/\sec.$

C. $28cm/\sec.$

D. $0.28cm/\sec.$

Answer: A

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196. The rate of change of volume of a sphere is equal to the rate of change of its radius, then its radius is equal to (a) 1 unit (b) units (c) unit (d) unit

A. 1

B. $\frac{1}{2\sqrt{\pi}}$

C. $\sqrt{2\pi}$

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

Answer: B

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197. A particle is projected vertically upwards .Its height H at a time t has the relation $h = (60)t - (16)t^2$. Velocity with which it hits the grounf is

A. 30 units

B. 60 units

C. 90 units

D. 180 units

Answer: B

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198. Two cars start from the same point at the same time .One travels westwards at $60km. /hr$. Two hours later , the distance between them is increasing at the rate of

A. $57km. /hr.$

B. $75km. /hr.$

C. $53km. /hr.$

D. $75m / \min .$

Answer: B

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199. 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 (a) cm2/sec (b) cm2/sec (c) 10 cm2/sec (d) 5 cm2/sec

A. $10\sqrt{2}cm^2/\sec$

B. $10\sqrt{3}cm^2/\sec$

C. $10cm^2/\sec$

D. $5cm^2/\sec$

Answer: B

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200. The volume of spherical ball is increasing at the rate of $4\pi \text{cc/sec}$. If its volume is 288π cc, then the rate of change of its radius is

A. $\frac{1}{4}$

B. $\frac{1}{12}$

C. $\frac{1}{36}$

D. $\frac{1}{9}$

Answer: C

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201. A cylindrical vessel of radius 0.5 m is filled with oil at the rate of 0.25 m3/minute. The rate at which the surface of the oil is rising, is (a) 1 m/min. (b) 2 m/min. (c) 5 m/min. (d) 1.25 m/min.

A. $1m / \min$.

B. $1.5m / \min$.

C. $2m / \min$.

D. $2.25m / \min$.

Answer: A

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202. Gas is being pumped into a a spherical balloon at the rate of $30ft^3 / \min$. Then the rate at which the radius increases when it reaches the value 15 ft, is

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

B. $\frac{1}{15\pi} ft / \min$.

C. $\frac{1}{20} ft / \min$.

D. $\frac{1}{25} ft / \min$.

Answer: A

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203. If a spherical balloon has a variable diameter $(3x + 9/2)$., then the rate of change of its volume w. r. t x is

A. $27\pi(2x+3)^2$

B. $\frac{27\pi}{8}(2x+3)^2$

C. $\frac{27\pi}{26}(2x+3)^2$

D. $\pi(2x+3)^3$

Answer: A

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204. An object moves along the curve $y = f(x)$. At a certain point, the slope of the curve is 0.5 and the abscissa is decreasing at the rate of $3\text{units}/\text{sec}$. At the point, the ordinate is

A. constant

B. increasing at the rate of $1.5\text{units}/\text{sec}$.

C. decreasing at the rate of $1.5\text{units}/\text{sec}$

D. fluctuating

Answer: C

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205. if the rate of a sphere increasing at the rate of $0.4 cm / \sec$, then, when the radius is decimetres , its surface area is increasing at the rate of

A. $160\pi cm^2 / \sec.$

B. $16.0\pi cm^2 / \sec.$

C. $1.60\pi cm^2 / \sec.$

D. $0.16\pi cm^2 / \sec.$

Answer: A

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206. At a given instant , the legs (sides) of a right - angled triangle are 16 cm and 12 cm. If the first side decreases at $0.5cm/\sec$ and the second increases at $2cm/\sec$, then, after 2 seconds , area of the triangle is increasing at the rate of

A. $14cm^2/\sec.$

B. $13cm^2/\sec.$

C. $11cm^2/\sec.$

D. $12cm^2/\sec.$

Answer: C

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207. At a given instant, the legs of a right -angle triangle are 6 inch. And 8inch. If the first leg increases at $2\text{inch}/\text{min}$ and the second decreases at $1\text{inch}/\text{min}$, then, after 2 minutes, area of the triangle is changing at the rate of

A. $1sq.\text{ inch}/\text{min}$.

B. $2sq.\text{ inch}/\text{min}$.

C. $2sq.\text{ Inch}/\text{min}$.

D. $5sq.\text{ inch}/\text{min}$.

Answer: A

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208. One leg of a right-angled tright increases at $2cm/\sec$. And the second decreases at $1cm/\sec$. When the lengths of the two legs are 3 cm and 4 cm respectively , the hypotenuse changes at the rate of $(\text{in}cm/\sec)$.

A. $\frac{5}{2}$

B. 2

C. $\frac{2}{5}$

D. 5

Answer: C

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209. Two sides of a triangle are 6 m and 8 m long , and angle between them is increasing at the rate of 2° per sec. When the angle between them is 60°, the third side is increasing at the rate of

A. $\dfrac{2\pi}{5\sqrt{39}} m / s$

B. $\dfrac{5\pi}{2\sqrt{39}} m / s$

C. $\dfrac{2\sqrt{39}}{5\pi} m / s$

D. $\dfrac{10\pi}{\sqrt{39}} m / s$

Answer: A

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210. Two parallel sides of a rectangle are increasing at the rate of $4cm/\sec$ while the other two sides are decreasing in such a way that the area of the rectangle remains constant at $80cm^2$. When the angle of a decreasing side is 8 cm , perimeter of the rectangle is changing at the rate of

A. $0.8cm/\sec.$

B. $1.6cm/\sec$

C. $0.6cm/\sec.$

D. $16cm/\sec.$

Answer: B

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211. Two parallel sides of a rectangle are being lengthened at the rate of $2cm/\sec$. While the other two sides are shortened in such a way that the figure remains a rectangle of constant area $50cm^2$. When the length of an increasing side 5 cm, perimeter of the rectangle is changing at the rate of

A. $-4cm/\sec.$

B. $4cm/\sec$

C. $100cm/\sec$

D. $-25cm/\sec$

Answer: A

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212. At a certain instant, diameter and altitude of a cylinder are 20 cm and 40 cm respectively. If diameter is increasing at the rate of $2cm / \sec$, then the rate of change in altitude to keep the volume constant is

A. $8cm / \sec.$

B. $-8cm / \sec.$

C. $6cm / \sec.$

D. $10cm / \sec.$

Answer: B

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213. Diameter and altitude of a right circular cylinder are 20 cm and 30 cm respectively .If the diameter is increasing at the rate of $4cm/\sec.$, then the rate of change in its altitude when the volume is constant is

A. $8cm/\sec.$

B. $12cm/\sec.$

C. $-6cm/\sec.$

D. $-12cm/\sec$

Answer: D

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214. Height of a right circular cylinder is increasing at the rate of $4cm/\sec$, and its base radius decreasing at $3cm/\sec$. When the base radius is 20 cm and height 10 cm, volume of the cylinder is changing at the rate of

A. $800\pi cm^3/\sec.$

B. $-800\pi cm^3/\sec.$

C. $400\pi cm^3/\sec.$

D. $200\pi cm^3/\sec.$

Answer: C

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215. Radius of base of a cone is increasing at the rate of $6cm/\sec$, and its altitude decreasing at $4cm/\sec$. When the radius is 8 cm, and altitude 10 cm, its volume is changing at the rate of

A. $\frac{704}{3}\pi/\sec.$

B. $\frac{740}{3}\pi/\sec.$

C. $\frac{740}{3}\pi/\sec.$

D. $\frac{407}{3}\pi/\sec.$

Answer: A

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216. Radius of base of a cone is increasing at $3cm / \min$, and its height decreasing at $4cm / \min$ .When the radius is 7 cm. and height 24 cm, its surface area is changing at the rate of

A. $63\pi cm^2 / \min$.

B. $84\pi^2 / \min$.

C. $88\pi cm^2 / \min$.

D. $72\pi cm^2 / \min$.

Answer: C

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217. A street-light is hung 20 ft. above the ground .An object falls freely under the gravity, starting from rest at the same height as the lamp and at a horizontal distance of 5 ft. from it . When the object has fallen through 16 ft, the speed of the shadow of the object on the ground is

A. $12ft. /\text{sec.}$

B. $11ft. /\text{sec}$

C. $10ft. /\text{sec.}$

D. $12.5ft. /\text{sec.}$

Answer: D

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218. $(4.05)^3 \approx ....$

A. 64.48

B. 65

C. 66.43

D. 66.8

Answer: C

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219. $(2.01)^4 \approx ....$

A. 16

B. 16.32

C. 16.5

D. 16.7

Answer: B

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220. $(3.03)^4 \approx \dots$

A. 84

B. 85

C. 84.24

D. 84.6

Answer: C

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221. $\sqrt{9.06} \approx \dots$

A. 3.1

B. 3.01

C. 3

D. 30.1

Answer: B

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222. $\sqrt{24} \approx \ldots.$

A. 4.2

B. 4.5

C. 4.8

D. 4.9

Answer: D

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223. $(128)^{1/3} \approx \ldots.$

A. 5.04

B. 5.4

C. 5.2

D. 5.1

Answer: A

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224. Find the approximate value of $(26)^{\frac{1}{3}}$.

A. 2.966

B. 2.9

C. 2.97

D. 2.8

Answer: A

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225. $(85)^{1/4} \approx \ldots.$

A. 3.3

B. 3.034

C. 3.4

D. 30.50

Answer: B

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226. $(63)^{1/3} \approx \ldots.$

A. 3.2529

B. 3.7

C. 3.7892

D. 3.9792

Answer: D

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227. $(18)^{1/4} \approx \ldots.$

A. 2.03125

B. 2.3125

C. 2.0125

D. 2.3025

Answer: A

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228. $(1020)^{1/5} \approx \ldots.$

A. 3.869

B. 3.9969

C. 2.969

D. 3.5692

Answer: B

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229. $(23)^{-1/2} \approx \ldots.$

A. 5.0008

B. 5.8

C. 5.08

D. 5.008

Answer: D

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230. $\frac{1}{3\sqrt{8.16}} \approx \ldots.$

A. 0.4

B. 0.48

C. 0.4997

D. 0.488

Answer: C

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231. Using Differential find $\frac{1}{\sqrt[4]{16.16}} \approx \ldots.$

A. 0.4782

B. 0.49875

C. 0.449

D. 0.45

Answer: B

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232. The approximate value of $(1.0002)^{3000}$, is

A. 1.2

B. 1.4

C. 1.6

D. 1.8

Answer: C

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233. The value of $(127)^{1/3}$ to four decimal places, is

A. 5.0267

B. 5.4267

C. 5.5267

D. 5.001

Answer: A

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234. If $y=\frac{x^3}{3}+\frac{x^2}{2}+x+4, x=2, \delta x=0.01,$ then $\delta y \approx \ldots$

A. 0.06

B. 0.05

C. 0.04

D. 0.07

Answer: D

235. If $y = x^4 + x^3 + x^2 + x + 1$, $x = 1$, $\delta x = 0.02$, then $\delta y \approx ....$

A. 0.02

B. 0.002

C. 0.2

D. 2

Answer: C

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236. If $y = 2x^2 - 3x + 5$, $x = 3$, $\delta x = 0.02$, then $\delta y \approx ...$

A. 1.8

B. 18

C. 0.18

D. 0.018

Answer: C

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237. If $y = 2x^2 - 3x + 5$, $x = 1$, $\delta x = 0.03$, then $\delta y \approx \ldots$

A. 0.21

B. 2.1

C. -2.1

D. 0.021

Answer: A

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238. If $y = 4x^2 - 3x + 5, x = 4, \delta x = 0.04,$ then $\delta y \approx \ldots$

A. 0.116

B. 1.16

C. 1.1

D. 1.06

Answer: B

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239. If $y = 4x^2 + 3x,\ x = 2,\ \delta x = 0.1,$ then $\delta y \approx \ldots$

A. 1.9

B. 1.92

C. 1.94

D. 1.93

Answer: C

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240. If $y = x^3 + 1, x = 4, \delta x = 0.2$, then $\delta y \approx ...$

A. 9.6

B. 1.6

C. 1.4

D. 1.46

Answer: A

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241. If $y = \frac{x^2}{2} - 4x, x = 2, \delta x = 0.1,$ then $\delta y \approx ...$

A. 0.195

B. 1.19

C. -1.95

D. -0.2

Answer: D

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242. If $y = \frac{1}{x}, x = 1, \delta x = 0.2$, then $\delta y \approx \ldots$

A. 6

B. -6

C. $-\frac{1}{6}$

D. $-\frac{1}{5}$

Answer: D

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243. If $y = \frac{2}{x}, x = 1, \delta x = 0.3$,then $\delta y \approx \ldots$

A. 0.06

B. 0.6

C. -0.06

D. -0.6

Answer: C

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244. If $y = \frac{1}{x^2}, x = 1, \delta x = 0.1$,then $\delta y \approx \ldots$

A. $\frac{-200}{9801}$

B. $\frac{2}{100}$

C. $\frac{201}{9801}$

D. $\frac{-201}{9081}$

Answer: B

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245. If $y = \frac{4}{x} - \frac{32}{x^3}, x = 2, \delta x = 0.2,$ then $\delta y \approx \ldots$

A. 0.01

B. 0.001

C. 0.1

D. -0.01

Answer: A

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246. If $y = \sqrt{x} - \frac{1}{\sqrt{x}}, x = 1, \delta x = 0.2$, then $\delta y \approx \ldots$

A. 0.1

B. 0.001

C. 0.01

D. 0.0001

Answer: C

Watch Video Solution

247. If $y = \log x, x = 5, \delta x = 0.05$, then $\delta y \approx \ldots$

A. 0.002

B. 0.01

C. 0.2

D. 2

Answer: B

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248. If $y=(\log x)-\frac{2}{x}, x=\frac{1}{2}, \delta x=10^{8}$, then $\delta y \approx$ ...

A. 10^{-9}

B. 10^{-10}

C. 10^{-6}

D. 10^{-7}

Answer: D

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249. If $(\log)_e 4=1.\ 3868$, then $(\log)_e 4.01=$ (a) 1.3968 (b) 1.3898 (c) 1.3893 (d) none of these

A. 1.3968

B. 1.3898

C. 1.3861

D. 1.3993

Answer: C

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250. If $\log 2 = 0.6934$, then $\log(2.02) \approx \ldots$

A. 0.7

B. 0.8034

C. 0.7034

D. 0.9034

Answer: C

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251. If $1^\circ = 0.01745^c, \sqrt{3} = 1.732,$ then $\sin 32^\circ \approx ....$

A. 0.5302

B. 0.5151

C. 0.544

D. 0.555

Answer: A

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252. If $1^\circ = 0.017$ radians, then the approximate value of $\sin 46^\circ$, is

A. 0.7294

B. 0.7194

C. 0.7394

D. 0.8

Answer: B

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253. $\cos 61^\circ$, it being given that $\sin 60^\circ = 0.86603$ and $1^\circ = 0.01745$ radian.

A. 0.4949

B. 0.499

C. 0.4849

D. 0.4948

Answer: C

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254. If $1^\circ = 0.01745^c$, then $\sin(30^\circ 3') \approx \ldots$

A. 0.504

B. 0.540

C. 0.520

D. 0.530

Answer: A

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255. $\cos 61^\circ$, it being given that $\sin 60^\circ = 0.86603$ and $1^\circ = 0.01745$ radian.

A. 0.4899

B. 0.4999

C. 0.4

D. 0.5897

Answer: B

Watch Video Solution

256. If $1^{\circ} = 0.01745^{c}$, then $\tan 47^{\circ} \approx \ldots$

A. 1.798

B. 1.799

C. 1.698

D. 1.812

Answer: C

Watch Video Solution

257. If $1^\circ = 0.01745^c$, then $\tan 44^\circ \approx \dots$

A. 0.9651

B. 1.034

C. 0.9995

D. 0.9999

Answer: A

Watch Video Solution

258. If $1^\circ = 0.018^c$, then $\tan(44^\circ 4') \approx ...$

A. 1.6006

B. 1.607

C. 1.807

D. 1.0024

Answer: D

Watch Video Solution

259. If $1^\circ = 0.0174^c$, then $\tan(45^\circ 50') \approx \dots$

A. 10.29

B. 1.029

C. 102.9

D. 1029

Answer: B

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260. If $\cos 30^\circ = 0.8650, 1^\circ = 0.0175^c$, then $\sin 29^\circ \approx \dots\dots$

A. 0.4646

B. 0.4747

C. 0.4848

D. 0.4949

Answer: C

Watch Video Solution

261. If $\cos 30^\circ = 0.8660, 1^\circ = 0.0175^c$, then $\sin 31^\circ \approx \dots$

A. 0.15156

B. 0.16165

C. 0.5656

D. 0.51516

Answer: D

Watch Video Solution

262. If $\cos 30^{\circ} = 0.8660, 1^{\circ} = 0.0175^{c}$, then $\cos(29^{\circ} 30') \approx \dots$

A. 0.870375

B. 0.860375

C. 0.85075

D. 0.8400375

Answer: A

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263. $\tan^{-1}(0.99) \approx \dots$

A. $\frac{\pi}{4} - 0.01$

B. $\frac{\pi}{4} - 0.04$

C. $\frac{\pi}{4} - 0.005$

D. $\frac{\pi}{4} - 0.02$

Answer: C

Watch Video Solution

264. Find the approximate values of :

$\tan^{-1}(1.001)$.

A. $\frac{\pi}{4} + 0.01$

B. $\frac{\pi}{4} 0.005$

C. $\frac{\pi}{4} + 0.0005$

D. $\frac{\pi}{4} + 0.002$

Answer: C

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265. If $e = 2.71828$, then $e^{1.002} \approx \dots$

A. 2.72723

B. 2.7237

C. 2.2737

D. 2.2377

Answer: B

Watch Video Solution

266. Find the approximate value of $e^{1.005}$ (given $e = 2.7183$)

A. 2.7319

B. 2.7391

C. 2.7182

D. 2.1005

Answer: A

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267. If $\log 3 = 1.0986$, then $3^{2.04} \approx \ldots$

A. 9.3945

B. 9.4593

C. 9.3954

D. 9.2040

Answer: C

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268. Use differential to approximate $\log(9.01)$. (Given, $\log 3 = 1.0986$)

A. 2.1942

B. 2.1983

C. 2.1857

D. 2.1947

Answer: B

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269. Find the approximate values of :

$\log_{10}(1002)$, given that $\log_{10} e = 0.4343$.

A. 3.0008686

B. 3.06868

C. 3.8686

D. 3.1002

Answer: A

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270. $2(2.001)^3 + 7(2.001) + 1 \approx \ldots$

A. 13.13

B. 31.31

C. 13.013

D. 31.031

Answer: C

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271. $(1.99)^3 - 3(1.99) + 5 \approx \dots$

A. 6.19

B. 6.091

C. 6.91

D. 6.199

Answer: C

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272. If the side of a square is $5.02cm$, the its approximate area is

A. $25.02cm^2$

B. $25.2cm^2$

C. $27cm^2$

D. $25.04cm^2$

Answer: B

Watch Video Solution

273. Ifb the side of a cube is 8.004 cm , then its approximate volume is

A. $512.8cm^3$

B. $512.96cm^3$.

C. $512.768cm^3$

D. $512.840cm^3$.

Answer: C

Watch Video Solution

274. If the diagonal of a square is $(1.02)\sqrt{2}cm$, then its approximate area is

A. $1.4cm^2$

B. $1.04cm^2$

C. $1.5cm^2$

D. $1.7cm^2$

Answer: B

Watch Video Solution

275. If the circumference of acircle is $(4.2)\pi$ cm , then its approximate area is

A. $4.2\pi cm^2$

B. $4.42\pi cm^2$

C. $4.22\pi cm^2$

D. $4.\ 5\pi cm^2$

Answer: B

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276. If the increments in u and v are δu and δv respectively, then the incremnt in their product uv is

A. $\delta u \delta v$

B. $u\delta v + v\delta u$

C. $u\delta v + v\delta u + \delta u \delta v$

D. $u\delta u + v\delta v$

Answer: C

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277. If the increments in u and v are δu and δv respectively, then the increment in $\frac{u}{v}$ is

A. $\frac{u\delta v + v\delta u}{v^2}$

B. $\frac{v\delta u - \delta v}{v^2}$

C. $\frac{v\delta u - u\delta v}{v(v + \delta v)}$

D. $\frac{u\delta u - v\delta v}{v^2}$

Answer: C

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278. The approximate value of $\sqrt[3]{28}$ is

A. 3.007

B. 3.037

C. 3.073

D. 3.003

Answer: B

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279. If, from mean value theorem ,

$f'(x_1) = \dfrac{f(b) - f(a)}{b - a}$, then:

A. $a < x_1 \leq b$

B. $a \leq x_1 < b$

C. $a < x_1 < b$

D. $a \leq x_1 \leq b$

Answer: C

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280. For which of the following functions is Rolle,s Theorem not applicable ?

A. $f(x) = x^{1/3} on[-1, 1]$

B. $f(x) = |x| on[1, 2]$

C. $f(x) = \tan^{-1} x \quad \text{on} \quad [0, 1]$

D. $f(x) = x + \dfrac{1}{x} \quad \text{on} \quad [1/2, 3]$

Answer: A

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281. For which of the following functions is Rolle`s Theorem not applicable ?

A. $f(x) = 3 + (x - 1)^{2/3} on [0, 3]$

B. $f(x) = e^{1 - x^3} on [-1, 1]$

C. $f(x) = \log(x^2 + 2) - \log 3 on [-1, 1]$

D. $f(x) = \sqrt{4 - x^2} on [-2, 2]$

Answer: A

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282. Rolle's theorem is not applicable for the function $f(x) = |x|$ in the intervel $[-1, 1]$ because

A. $f(x)$ is not differentiable at $x = 1$

B. $f(x)$ is not continupus at $x = -1$

C. $f(x)$ is not continuous at $x = 0$

D. $f(x)$ is differential at $x = 0$

Answer: D

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283. Rolle's theorem is not applicable for the function $f(x) = |x|$ in the intervel $[-1, 1]$ because

A. $f(x)$ is not derivable at $x = 1$

B. $f(x)$ is not derivable at $x = -1$

C. $f(x)$ is not continuous at $x = 0$

D. none of these

Answer: C

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284. if f(x)=(x -4) (x-5) (x-6) (x-7) then.

A. $f'(x) = 0$ has 4 roots

B. $f'(x)$ has 3 zeroes in $(4, 5) \cup (5, 6) \cup (6, 7)$

C. $f'(x) = 0$ has only one root

D. $f'(x)$ has 3 zeroes in $(3, 4) \cup (4, 5) \cup (5, 6)$

Answer: B

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285. Let a and b be two distinct roots of a polynomial equation f(x) =0 Then there exist at least one root lying between a and b of the polynomial equation

A. $f(x)$

B. $f'(x)$

C. $f''(x)$

D. none of these

Answer: B

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286. Find the condition if the equation $3x^2 + 4ax + b = 0$ has at least one root in $(0, 1)$.

A. $4a + b + 3 = 0$

B. $2a + b + 1 = 0$

C. $a = -4/3, b = 0$

D. none of these

Answer: B

Watch Video Solution

287. If $2a+3b+6c=0,$ then prove that at least one root of the equation $ax^2+bx+c=0$ lies in the interval (0,1).

A. $(0, 1)$

B. $(1, 2)$

C. $(2, 3)$

D. none of these

Answer: A

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288. If $f'(c) = \frac{f(b) - f(a)}{b - a}$, where $f(x) = e^x$, $a = 0$ and $b = 1$, then: c = ...

A. $\log_e(e - 1)$

B. $\log_e(e + 1)$

C. $\log_e\left(\frac{1}{e} + 1\right)$

D. -2

Answer: A

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289. If mean value theorem holds for the function $f(x) = (x-1)(x-2)(x-3), x \in [0, 4]$, then c=

A. $2 + \left(\sqrt{3}/2\right)$

B. $3 \pm \left(2/\sqrt{3}\right)$

C. $2 \pm \left(2/\sqrt{3}\right)$

D. none of these

Answer: C

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290. The function $f(x) = x(x+3)e^{-\left(\frac{1}{2}\right)x}$ satisfies the conditions of Rolle's theorem in (-3,0). The value of c, is

A. -2

B. 1

C. 0

D. 2

Answer: A

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291. If the functio $f(x)^3 - 6x^2 + ax + b$ satisfies Rolle's theorem in the interval [1,3] and $f'\left(\frac{2\sqrt{3}+1}{\sqrt{3}}\right) = 0,$ then

A. $a = 11, b \in R$

B. $a = -11, b = 6$

C. $a = 11, b = 6$

D. none of these

Answer: A

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292. Let f(x) and g(x) be defined and differntiable for all

$x \geq x_0$ and $f(x_0) = g(x_0) f(x) \geq (x) f$ or $x > x_0$

then

A. $f(x) < g(x)$ for some $x > x_0$

B. $f(x) = g(x)$ for some $x > x_0$

C. $f(x) > g(x)$ for all $x > x_0$

D. none of these

Answer: C

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293. Let $\frac{a_0}{n+1}+\frac{a_1}{n}+\frac{a_2}{n-1}+\quad+\frac{a_{n-1}}{2}+a_n=0.$

Show that there exists at least real x between 0 and 1 such that $a_0x^n+a_1x^{n-1}+a_2x^{n-2}+\quad+a_n=0$

A. at least one zero

B. at most one zero

C. only 3 zeroes

D. only 2 zeroes

Answer: A

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294. Let f be differentiable for all x, If $f(1) = -2 and f'(x) \geq 2$ for all $x \in [1, 6]$, then find the range of values of $f(6)$.

A. $f(6) < 8$

B. $f(6) \geq 8$

C. $f(6) \geq 5$

D. $f(6) \leq (5)$

Answer: B

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295. Rolle's theorem hold for the function $f(x) = x^3 + bx^2 + cx, 1 \leq x \leq 2$ at the point 4/3, the values of b and c are

A. $b = 8, c = -5$

B. $b = -5c = 8$

C. $a = -2/3, b = 1$

D. $a = 2/3, b = 1$

Answer: B

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296. $f(x) = 2x^2 + 3$

A. $I_1 = \left(-\frac{3}{2}, 0\right), I_2 = \left(0, \frac{3}{2}\right)$

B. $I_1 = \left(-\frac{2}{3}, 0\right), I_2 = \left(0, \frac{2}{3}\right)$

C. $I_1 = (0\infty), I_2 = (-\infty, 0)$

D. none of these

Answer: C

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297. $f(x) = 3x^2 - 6x + 1$

A. $I_1 = (-3, 0), I_2 = (0, 6)$

B. $I_1 = (1, \infty), I_2 = (-\infty, 1)$

C. $I_1 = (3, 6), I_2 = \phi$

D. none of these

Answer: B

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298. $(y) = 2 - 3x - 5x^2$

A. $I_1 = (2, 3), I_2 = (3, 5)$

B. $I_1 = (2, 5), I_2 = (3, 4)$

C. $I_1 = (\infty, -3), I_2 = (-3, \infty)$

D. $I_1 = (-\infty, -0.3), I_2 = (-0.3, \infty)$

Answer: D

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299. $f(x) = x^2 + 4 - .1$

A. $I_1 = (-\infty, 0.2), I_2 =)0.2, \infty)$

B. $I_1 = (-1, 4), I_2 = (4, \infty)$

C. $I_1 = (-4, 4), I_2 = (4, \infty)$

D. $I_1 = (-\infty, 2), I_2 = (2, \infty)$

Answer: C

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300. $f(x) = 10x^2 - 20x + 5$

A. $I_1 = (1, \infty), I_2 = (-\infty, 1)$

B. $I_1 = (-1, 2), I_2 = (2, \infty)$

C. $I_1 = (-4, 1) I_2 = (1, \infty)$

D. none of thses

Answer: A

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301. $f(x) = 6 - 12x - 18x^2$

A. $I_1 = (-\infty, -3), I_2 = (-3, \infty)$

B. $I_1 = \left(-\infty, -\frac{1}{3}\right), I_2 = \left(-\frac{1}{3}, \infty\right)$

C. $I_1 = (-2, 1), I_2 = (1, 3)$

D. none of these

Answer: B

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302. $f(x) = 2x^2 + 3x^2 - 12x + 5$

A. $I_1 = (-\infty, -2) \cup (1, \infty), I_2 = (-2, 1)$

B. $I_1 = (-\infty, -1), I_2 = (-1, 2) \cup (2, \infty)$

C. $I_1 = (-\infty, -1) \cup (2, \infty), I_2 = (-1, 2)$

D. none of these

Answer: A

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303. $f(x) = 24x^3 + 3x^2 - 3x + 7$

A. $I_1 = \left(-\frac{1}{4}, \frac{1}{6}\right), I_2 = \left(\frac{1}{6}, \infty\right)$

B.

$$I_1 = \left(-\infty, -\frac{1}{4}\right), \cup \left(\frac{1}{6}, \infty\right), I_2 = \left(-\frac{1}{4}, \frac{1}{6}\right)$$

C. $I_1 = \left(-\frac{1}{6}, \frac{1}{4}\right), I_2 = \left(\frac{1}{4}, \frac{1}{3}\right) \cup \left(\frac{1}{3}, \infty\right)$

D. none of these

Answer: B

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304. $f(x) = \frac{x^3}{3} + \frac{7x^2}{2} + 12x + 6$

A. $I_1 = (-\infty, -4) \cup (-4, -3), I_2 = (-3, \infty)$

B. $I_1 = (-3, \infty), I_2 = (-\infty, -4) \cup (-4, -2)$

C. $I_1 = (-\infty, -4) \cup (-3, \infty), I_2 = (-4, -3)$

D. none of these

Answer: C

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305. $f(x) = -\frac{1}{3}x^3 + 5x^2 + 12$

A. $I_1 = (0, 10), I_2 = (-\infty, 0) \cup (10, \infty)$

B. $I_1 = (-\infty, 0), I_2 = (0, 10) \cup (10, \infty)$

C. $I_1 = (-\infty, 10), I_2 = (10, \infty) \cup (0, 10)$

D. none of these

Answer: A

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306. $f(x) = 3x + \dfrac{1}{3x}$

A. $I_1 = (-3, 0) \cup (0, 1), I_2 = (1, 2) \cup (2, \infty)$

B.

$I_1 = (-3, 0) \cup (1, \infty), I_2 = (-\infty, -3) \cup (0, 1)$

C. $I_1 = (-3, 1), I_2 = (2, \infty)$

D. none of these

Answer: D

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307. $f(x) = \sqrt{x} - \frac{1}{\sqrt{x}}$

A. $I_1 = (0, \infty), I_2 = \phi$

B. $I_1 = \phi, I_2 = (0, \infty)$

C. $I_1 = \phi, I_2 = (-\infty, 0)$

D. none of these

Answer: A

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308. $f(x) = x^2(x-8)$ is increasing in

A. $(-\infty, 0)$

B. $(-\infty, 1)$

C. $\left(0, \frac{16}{3}\right)$

D. R

Answer: A

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309. The largest interval in which $f(x) = x^3 + 6x^2 + 36x + 7$ increasing is

A. ϕ

B. R^-

C. R^+

D. R

Answer: D

Watch Video Solution

310. $y = x - \sqrt{x}$ increasing in

A. $-\infty, \left(\frac{1}{4}\right)$

B. $\left(\frac{1}{4}, \infty\right)$

C. $\left(0, \frac{1}{4}\right)$

D. R^{+}

Answer: B

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311. $y = x + \frac{1}{x}$ increasing in

A. $(-1, 1)$

B. $(0, 1)$

C. $(-\infty, -1) \cup (1, \infty)$

D. R

Answer: C

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312. $f(x) = 80 - 25x^3 + 3x$ is increasing in

A. R

B. $\left(\frac{1}{5}, \infty\right)$

C. $\left(-\infty, -\frac{1}{5}\right)$

D. $\left(-\frac{1}{5}, \frac{1}{5}\right)$

Answer: D

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313. $f(x) = 6 + 24x - 18x^2 + 4x^3$ increasing in

A. $(1, 2)$

B. $(1, \infty)$

C. $(-\infty, 2)$

D. $(-\infty, 1) \cup (2, \infty)$

Answer: D

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314. $f(x) = 18x^2 - 30x - 2x^3 + 10$ increasing in

A. $(-\infty, 1) \cap (5, \infty)$

B. $(1, 5)$

C. R^{+}

D. R

Answer: B

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315. $f(x) = x^3 - 9x^2 + 36x + 2$ is increasing in

A. R

B. ϕ

C. R^{-}

D. R^{+}

Answer: A

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316. $f(x) = x^3 - 9x^2 - 21x + 18$ is increasing in

A. $(2, 3)$

B. $(3, 4)$

C. $(7, \infty)$

D. $(1, 6)$

Answer: C

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317. $y = x^3 + 3$ increasing in

A. R

B. $R - \{0\}$

C. ϕ

D. R^+

Answer: A

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318. $y = -x^3$ increasing in

A. R

B. $R - \{0\}$

C. ϕ

D. R^{-}

Answer: C

Watch Video Solution

319. $y = x^6 + 4$ increasing in

A. R^{-}

B. R^{+}

C. R

D. ϕ

Answer: B

Watch Video Solution

320. $y = x^5 + 5$ increasing in

A. R*

B. R^+

C. R^-

D. ϕ

Answer: A

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Watch Video Solution

321. $y = x . \log x$ increasing in

A. $\left(\frac{1}{e}, \infty\right)$

B. $\left(0, \frac{1}{e}\right)$

C. $(0, e)$

D. R^{+}

Answer: A

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322. the function $f(x) = \dfrac{\log x}{x}$ is increasing in the interval

A. $(-\infty, e)$

B. $(0, e)$

C. (e, ∞)

D. R^+

Answer: B

Watch Video Solution

323. $y = \dfrac{x}{\log x}$ increasing in

A. ϕ

B. R^+

C. $(0, e)$

D. (e, ∞)

Answer: D

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324. $y = x - \log(1 + x)$ increasing in

A. R^-

B. R^+

C. $(0, 1)$

D. $(-\infty, 0) \cup (1, \infty)$

Answer: B

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325. $y = 2x^2 - \log x$ increasing in

A. $\left(-\frac{1}{2}, 0\right) \cup \left(\frac{1}{2}, \infty\right)$

B. $\left(-\infty, -\frac{1}{2}\right)$

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

D. R

Answer: C

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326. $y = 9x^3 - \log x$ increasing in

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

B. R

C. $(-\infty, 0) \cup \left(\frac{1}{3}, \infty\right)$

D. R^+

Answer: A

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327. $y = 4x^3 - 42x^2 + 144x + 8$ decreasing in

A. ϕ

B. R

C. $(3, 4)$

D. $(-\infty, 3) \cup (4, \infty)$

Answer: C

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328. $y = -2x^3 - 6x + 24$ decreasing in

A. ϕ

B. R^-

C. R^+

D. R

Answer: D

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329. $y = x + \log(x+1)$ decreases in

A. $(-2, -1)$

B. $(-\infty, -2) \cup (-1, \infty)$

C. $(-1, \infty)$

D. ϕ

Answer: D

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330. $y = 2x^2 + \log x$ decreases in

A. R^+

B. R^-

C. R

D. ϕ

Answer: D

Watch Video Solution

331. $y = 9x^3 + \log x$ decreases in

A. ϕ

B. $\left(-\infty, -\frac{1}{3}\right)$

C. $\left(-\frac{1}{3}, \infty\right)$

D. R^{+}

Answer: A

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332. $y = \frac{x+5}{x-5}$ decreases in

A. R^{-}

B. $R^{+} - \{5\}$

C. $R - \{5\}$

D. R^{+}

Answer: C

Watch Video Solution

333. $y = \frac{x}{\log x}$ increases in

A. ϕ

B. R^{+}

C. $(-\infty, -2) \cup (0, 2)$

D. ϕ

Answer: C

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334. $y = \frac{x}{3} + \frac{3}{x}$ decreases in

A. $(-\infty, -3)$

B. $(3, \infty)$

C. $(-\infty, -3) \cup (3, \infty)$

D. $(-3, 3)$

Answer: D

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335. $f(x) = x^3(x-2)^2$ decreases in

A. $\left(-\infty, \frac{6}{5}\right)$

B. $2, \infty)$

C. $(0, 2)$

D. $\left(\frac{6}{5}, 2\right)$

Answer: D

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336. $f(x) = \sqrt{25 - x^2}$ is increasing in

A. $(-5, 5)$

B. ϕ

C. $(-5, 0)$

D. $(5, \infty)$

Answer: C

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337. $f(x) = \sqrt{36x^2 - 25}$ is increasing in

A. $\left(-\frac{5}{6}, 0\right)$

B. $\left(\frac{5}{6}, \infty\right)$

C. $\left(-\frac{5}{6}, \frac{5}{6}\right)$

D. R^+

Answer: B

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338. $f(x) = \sqrt{16 - x^2}$ decreases in

A. R^+

B. $(-4, 0)$

C. $(0, 4)$

D. ϕ

Answer: C

Watch Video Solution

339. $f(x) = \frac{1}{\sqrt{9 - 4x^2}}$ decreases in

A. $\left(-\frac{3}{2}, \frac{3}{2}\right)$

B. $(0, 3)$

C. $(0, \infty)$

D. $\{5\}$

Answer: A

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340. $y = \frac{x+2}{x-2}$ increases in

A. ϕ

B. $R - \{2\}$

C. $R^{-} - \{2\}$

D. $(-2, 2)$

Answer: A

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341. $y = \dfrac{x^3}{x^2 + 15}$ increases in

A. R

B. R^+

C. R^-

D. $(-\sqrt{15}, \sqrt{15})$

Answer: A

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342. $f(x) = \frac{x}{1+x^2}$ decreases in

A. $(-1, 1)$

B. $(-\infty, -1) \cup (1, \infty)$

C. R

D. $(-1, 1)$

Answer: B

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343. In $(0, \infty)$ then function $f(x) = \frac{\log(1+x)}{x}$ is

A. increasing

B. decreasing

C. stationary

D. fluctuating

Answer: B

Watch Video Solution

344. $f(x) = x - \frac{1}{x}$ is

A. increasing in R

B. decreasing in R^{+}

C. increasing in $R - \{0\}$

D. none of these

Answer: C

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345. At $x = 0$, then function $f(x) = 3\sqrt{2}x$ is

A. decreasing

B. increasing

C. stationary

D. maximum

Answer: B

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346. For all $x > 0$

A. $\frac{2x}{5} > \log(1 + x)$

B. $x > \log(1 + x)$

C. $x < \log(1 + x)$

D. $x = \log(1 + x)$

Answer: B

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347. $f(x) = 3x^4 - 4x^3 + 6x^2 - 12x + 12$ decreases in

A. $(1, \infty)$

B. $(-\infty, -1) \cup (-1, 3)$

C. $(-\infty, 1)$

D. none of these

Answer: C

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348. $f(x) = \dfrac{x^2+1}{x^2-1}$ decreases in

A. $(-\infty, -1) \cup (1, \infty)$

B. $(0, 1) \cup (1, \infty)$

C. $R - \{-1, 1\}$

D. none of these

Answer: B

Watch Video Solution

349. $f(x) = \frac{x^2 - 1}{x}$ decreases in

A. $R - \{0\}$

B. $(-1, 0) \cup (0, 1)$

C. ϕ

D. none of these

Answer: C

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350. $f(x) = \frac{1 - x + x^2}{1 + x + x^2}$ decreases in

A. $(-1, 1)$

B. $(-\infty, -1) \cup (1, \infty)$

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

D. none of these

Answer: A

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351. $f(x) = \log(7 - 4x - 3x^2)$ decreases in

A. $\left(-\frac{7}{3}, 0\right)$

B. $\left(-\frac{1}{3}, 0\right)$

C. $\left(0, \frac{1}{3}\right)$

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

Answer: D

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352. $f(x) = x - e^x$ increases in

A. $(0, \infty)$

B. $(-\infty, 0)$

C. R

D. none of these

Answer: B

Watch Video Solution

353. In $(-6, 2)$, the function $f(x) = x^3 + 6x^2 - 36x + 7$ is

A. decreasing

B. increasing

C. constant

D. none of these

Answer: A

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354. In $(0.\ 25, 0.50)$, the function $f(x)=\frac{4x^2+1}{x}$

A. decreases

B. increases

C. oscillates

D. none of these

Answer: A

Watch Video Solution

355. In $(0.50, 1)$, the function $f(x) = 2x + \frac{1}{2x}$ is

A. constant

B. oscillating

C. decreasing at the rate of $1.5\text{units}/\sec$

D. increasing

Answer: D

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356. Function $f(x) = x^2 - 3x + 4$ has minimum value at x = ...

A. 0

B. 1

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

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

Answer: D

Watch Video Solution

357. Function $f(x) = -x^2 + 10x + 12$ has maximum value at x =

A. -5

B. 5

C. -4

D. 3

Answer: B

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358. $f(x) = 2x^3 - 18x^2 + 30x + 36$ has minimum value at x =

A. 1

B. -1

C. 5

D. -5

Answer: C

Watch Video Solution

359. $f(x) = 2x^3 - 3x^2 - 36x + 24$ has maximum value at x =

A. -2

B. -3

C. 2

D. 3

Answer: A

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360. $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 20$ has minimum value at x =

A. 0

B. -1

C. 2

D. 1

Answer: D

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361. $f(x)=x^4-12x^3+52x^2-96x+48$ has maximum value at x = ...

A. -4

B. 2

C. 3

D. 4

Answer: C

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362. Manimum value of $f(x)=3x^2-4x+5$ is

A. $-\frac{11}{3}$

B. $\frac{11}{3}$

C. $\frac{3}{11}$

D. $-\frac{3}{11}$

Answer: B

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363. Minimum value of $f(x) = 6x^3 - 9x^2 - 36x + 24$ is

A. 36

B. -72

C. -36

D. 72

Answer: C

Watch Video Solution

364. Minimum value of $f(x) = 4x^3 - 12x^2 - 36x$ is

A. -108

B. 108

C. 54

D. -54

Answer: A

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365. $f(x) = 2x^3 - 9x^2 + 12x + 5$ has maximum at the point

A. $(1, 2)$

B. $(2, 9)$

C. $(1, 10)$

D. $(2, 10)$

Answer: C

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366. $f(x) = 8x^3 - 75x^2 + 150x$ has maximum at the point

A. $(5, -22)$

B. $(5, -125)$

C. $\left(\frac{5}{4}, \frac{1375}{16}\right)$

D. $(5, 1375)$

Answer: B

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367. $f(x) = x^3 - 6x^2 + 9x - 2$ has maximum at the point

A. $(-2, 3)$

B. $(3, -2)$

C. $(2, 3)$

D. $(1, 2)$

Answer: D

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368. $f(x) = x^3 - 9x^2 + 15x + 3$ has maximum at the point

A. $(1, 10)$

B. $(5, -22)$

C. $(1, 2)$

D. $(1, -22)$

Answer: B

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369. If $f(x) = x^3 - 9x^2 + 24x$, then f

A. $(1, 10)$

B. $(2, 20)$

C. $(3, 30)$

D. $(4, 40)$

Answer: B

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370. $f(x) = x^3 - 2x^2 + x + 10$ has minimum at the point

A. $\left(\frac{1}{3}, \frac{274}{27}\right)$

B. $(2, 20)$

C. $(1, 10)$

D. $(2, 10)$

Answer: C

Watch Video Solution

371. $f(x) = 2x^3 + 3x^2 - 12x + 7$ has maximum at the point

A. $(1, 0)$

B. $(2, 9)$

C. $(-2, 9)$

D. $(-2, 27)$

Answer: D

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372. $f(x) = 2x^3 - 3x^2 - 12x + 12$ has minimum at the point

A. $(2, -8)$

B. $(2, 8)$

C. $(-1, 19)$

D. $(2, 19)$

Answer: A

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373. Local minimum of $f(x) = x + \frac{1}{x}$, where $x > 0$, is

A. 0

B. 2

C. 1

D. 3

Answer: B

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374. Local maximum of $f(x) = x + \frac{1}{x}$, where $x < 0$, is

A. 0

B. -1

C. -2

D. -3

Answer: C

Watch Video Solution

375. If $x^2y^2 = 1$, then minimum of $x^2 + y^2$ is

A. 3

B. 4

C. -2

D. 2

Answer: D

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376. If $f(x) = bx^2 + ax$ has minimum at $(2, -12)$ then $(a, b) \equiv ..$

A. $(3, -12)$

B. $(-12, 3)$

C. $(-3, -12)$

D. $(-12, -3)$

Answer: B

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377. If minimum of $f(x) = \frac{a}{x} + bx$ at $x = 2$ is 2, then $(a, b) \equiv$ ....

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

B. $(2, 2)$

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

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

Answer: A

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378. If $f(x) = a\log x + bx^2 + x$ has extrema at $x = 1 ans x = 2$ then $(6a, 6b) \equiv . .$

A. $(4, 1)$

B. $(-4, -1)$

C. $(1, 4)$

D. $(-1, -4)$

Answer: B

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379. If $f(x) = P \log|x| + qx^2 + x$ has extrema at $x = 1$ and $a = -\frac{4}{3}$, then $(p, q) \equiv \ldots$

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

B. $\left(-4, \frac{3}{4}\right)$

C. $\left(-4, \frac{3}{2}\right)$

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

Answer: C

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380. If $x+y=k$, where $x, y \varepsilon N$ then xy is maximum when $(x, y) \equiv ..$

A. $\left(\frac{k}{3}, \frac{2k}{3}\right)$

B. $\left(\frac{k}{4}, \frac{3k}{4}\right)$

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

D. $\left(\frac{2k}{3}, \frac{2k}{3}\right)$

Answer: C

Watch Video Solution

381. If $xy = k$, where $x, y \varepsilon N$, then $x + y$ is minimum when $(x, y) \equiv$ ...

A. $(k, 1)$

B. $(\sqrt{k}, \sqrt{k})$

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

D. $\left(k^{2/3}, k^{2/3}\right)$

Answer: B

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382. Among rectangle of given area , rectangle with least perimeter will have sides aa, b such that

A. $ab = 1$

B. $a = \sqrt{2}b$

C. $a = 2b$

D. $a = b$

Answer: D

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383. Among rectangle of given area , rectangle with least perimeter will have sides aa, b such that

A. $k, 0$

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

C. $\frac{k}{2}, \frac{k}{2}$

D. $\frac{2}{k}, \frac{2}{k}$

Answer: C

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384. If product of two positive number is k then sum of their squares is minimum when they are

A. $k, 1$

B. $\sqrt{k}, \sqrt{k}$

C. $k^{1/3}, k^{2/3}$

D. $k^{2/3}, k^{3/4}$

Answer: B

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385. A line segment AB of length 16 is divided into two part AP and PB by a point P .If $AP^2 + PB^2$ is minimum, then

A. P trisects seg AB

B. AP:PB=3:1

C. P bisects seg AB

D. AP:PB=1:3

Answer: C

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386. If sum of two positive numbers is k, then sum of their cubes is minimum when they are

A. $\frac{k}{2}, \frac{k}{2}$

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

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

D. $\frac{k}{8}, \frac{7k}{8}$

Answer: A

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387. Two numbers x and y such that $x + y = 2$ and $x^3 . y$ is maximum are

A. $\frac{1}{3}, \frac{5}{3}$

B. $\frac{3}{2}, \frac{1}{2}$

C. $1, 1$

D. $\frac{2}{3}, \frac{4}{3}$

Answer: B

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388. Find the point on the curve $y^2 = 4x$ which is nearest to the point $(2,\ 1)$.

A. $(0, 0)$

B. $(1,\ -2)$

C. $(1, 2)$

D. $(-1, 2)$

Answer: C

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389. Minimum value of $f(x) = x^3 + \frac{3}{x} + 1$ is

A. 3

B. 4

C. 5

D. 9

Answer: C

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390. If product of two positive number is k then the least value of their sum is

A. $2k^2$

B. $2\sqrt{k}$

C. $\frac{\sqrt{k}}{2}$

D. k^2

Answer: B

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391. Dimensions of a rectangle of least perimeter with given area k are

A. $2\sqrt{k}, \frac{\sqrt{k}}{2}$

B. $\sqrt{k}, \sqrt{k}$

C. $3\sqrt{k}, \frac{\sqrt{k}}{3}$

D. k, k

Answer: A

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392. Shortest distance from $(3, 4)$to line $3x + 4y = 50$ is

A. 5

B. 10

C. 15

D. 20

Answer: D

Watch Video Solution

393. Point on curve $x^2 - y^2 + 16 = 0$, nearest to $(6, 0)$ is

A. $(0, -4)$

B. $(0, 4)$

C. $(5, 3)$

D. $(3, 5)$

Answer: A

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394. $f(x) = -2x^2 - 4x + 5$ has maximum value at $x = ...$

A. -1

B. 1

C. 0

D. -2

Answer: C

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395. $f(x) = 2x^3 + 3x^2 - 12x + 5$ has maximum value at $x^=$ ...

A. 1

B. 0

C. -2

D. -1

Answer: D

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396. $f(x) = x^4 - 24x^3 + 144x^2$ has maximum value at x = ...

A. 0

B. 12

C. -2

D. -2

Answer: B

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397. Maximumvalue of $f(x) = 2x - 6 - x^2$ occurs at x =

....

A. -2

B. 1

C. -16

D. 0

Answer: C

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398. Maximum value of $f(x) = 2x^3 - 9x^2 + 12x - 2$is

A. 1

B. 2

C. 3

D. 4

Answer: A

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399. Maximum value of $f(x) = 2x^3 - 9x^2 + 24x - 15$ is

A. 5

B. 4

C. 2

D. 1

Answer: D

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400. Maximum value of $f(x) = 2x^3 - 3x^2 - 12x + 6$ is

A. 12

B. 11

C. 10

D. 13

Answer: B

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401. Maximum value of $f(x) = (x - 2)^2 . (x - 3) + 1$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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402. If one side of a triangle , inscribed in a semi-circle of radius r,is the bounding diameter, then ist maximum aera is

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

B. $\frac{\pi r^2}{4}$

C. $\frac{r^2}{2}$

D. r^2

Answer: B

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403. If two sides of a triangle are each k, then its maximum area is

A. k^2

B. $\frac{k^2}{2}$

C. $2k^2$

D. $\frac{\sqrt{3}k^2}{4}$

Answer: B

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404. If area of a rectangle is k^2 , where $k > 0$, then its minimum perimeter is

A. $4k$

B. $2k^2$

C. $4k^2$

D. k

Answer: A

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405. Show that the semi-vertical angle of the cone of the maximum volume and of given slant height is $\tan^{-1}\sqrt{2}$.

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

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

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

D. $\cot^{-1}\sqrt{2}$

Answer: D

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406. Height of greatest cone inscribed in a sphere of radius r is

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

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

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

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

Answer: B

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407. Height of a cone, inscribed in a sphere of radius r, having greatest curved surface is

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

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

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

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

Answer: D

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408. If $P \equiv (-2, -3)$ and $Q \equiv (3, 7)$, then point A on the X- axis such that $AP^2 + AQ^2$ is minimum is

A. $\left(\frac{1}{3}, 0\right)$

B. $\left(-\frac{1}{3}, 0\right)$

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

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

Answer: C

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409. If $x + y = 12$, then minimum value of $x^2 + y^2$ is

A. 48

B. 36

C. 72

D. 144

Answer: B

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410. The minimum distance from the point (4, 2) to $y^2 = 8x$ is equal to

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: C

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411. If $x > 0$ and $xy = 1$, the minimum value of $(x + y)$ is

A. 1

B. 0

C. 2

D. 3

Answer: C

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412. The value of a so that volume of parallelopiped formed by vectors $\hat{i} + a\hat{j} + \hat{k}, \hat{j} + a\hat{k}, a\hat{i} + . \hat{k}$ becomes minimum is

A. -3

B. 3

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

D. $\sqrt{3}$

Answer: B

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413. Total cost of producing x items is $Rs\frac{x^2}{4} + 25x - 50$ and selling perice of each is $Rs100 - \frac{x}{4}$. The output for maximum profit must be

A. 25

B. 75

C. 50

D. 100

Answer: D

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414. Total cost of producing x items is $Rs(x^2 + 10x + 12)$ and selling price of each is $Rs(330 - x)$. Then output for maximum profit must be

A. 50

B. 60

C. 70

D. 80

Answer: A

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415. If sum of radius and height of a cylinder is 6, then ist maximum volume is

A. 32π

B. 16π

C. 8π

D. 4π

Answer: D

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416. A square piece of tin of side 12 cm is to be made into a box without a lid by cutting a square from each corner and folding up the flaps to form the sides. What should be the side of the square to be cut off so that the volume of the box is maximum ? Also, find this maximum volume

A. 6

B. 4

C. 3

D. 2

Answer: C

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417. When x is positive, the minimum value of x^x is

A. e^e

B. $\frac{1}{e^e}$

C. $e^{-1/e}$

D. $e^{1/e}$

Answer: B

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418. The minimum value of the function $f(x) = x \log x$ is

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

B. $-\frac{1}{e}$

C. e

D. $-e$

Answer: A

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419. The minimum value of $x\,(\log)_e x$ is equal to e (b) $1/e$ (c) $-1/e$ (d) $2e$ (e) e

A. e

B. $\frac{1}{e}$

C. $-e$

D. $-\frac{1}{e}$

Answer: D

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420. Show that the maximum value of $\left(\frac{1}{x}\right)^{x}$ is $e^{\frac{1}{e}}$.

A. e

B. $(1/e)^{e}$

C. $e^{-1/e}$

D. $e^{1/e}$

Answer: C

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421. The maximum value of $\left(\frac{\log x}{x}\right)$ is

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

B. e

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

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

Answer: B

Watch Video Solution

422. Two positive number x and y such that $x + y = 6$, and xy^2 is as large possible , are

A. $1, 5$

B. $2, 4$

C. $3, 3$

D. $1.5, 4.5$

Answer: B

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423. If volume of a box, having square base and open top, is $108m^3$, then its minimum area is

A. $108m^2$

B. $18m^2$

C. $81m^2$

D. $801m^2$

Answer: A

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424. The minimum value of $\left(x^2 + \frac{250}{x}\right)$ is (a) 75 (b) 50 (c) 25 (d) 55

A. 75

B. 50

C. 25

D. 55

Answer: A

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425. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at $x = 2$ (b) $x = -2$ $x = 0$ (d) $x = 1$

A. $x = 2$

B. $x = -2$

C. $x = 0$

D. $x = 1$

Answer: A

Watch Video Solution

426. An open box with a square base is to be made out of a given quantity of cardboard of area c^2 Show that the maximum volume of box is $\frac{c^3}{6\sqrt{3}}$

A. $\frac{\sqrt{3}a^3}{6}$

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

C. $\frac{a^3}{6\sqrt{3}}$

D. $\frac{a^3}{5}$

Answer: C

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427. A population p(t) of 1000 bacteria introduced intonutrient medium grows according to the relation $p(t) = 1000 + 1000\frac{t}{100 + t^2}$. The maximum size of the this bacterial population is

A. 1100

B. 1250

C. 1050

D. 5250

Answer: C

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428. The denominator of a fraction is greater than 16 of the square of numerator, then least value of fraction is

A. $-1/4$

B. $-1/8$

C. $1/12$

D. $1/16$

Answer: B

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429. A manufacturer can sell x items at the price of Rs. $(330 - x)$ each. The cost of producing xitems is Rs.

$x^2 + 10x - 12$. How many items must be sold so that his profit is maximum?

A. 60

B. 80

C. 100

D. 120

Answer: B

Watch Video Solution

430. A right circular cone have slant height 3 cm. Then its volume is maximum at height

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

B. $\sqrt{3}$

C. $\sqrt{2}$

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

Answer: B

Watch Video Solution

431. Equation of the horizonatl tangent to the curve $y = e^x + e^{-x}$ is

A. $y = -2$

B. $y = 1$

C. $y = 2$

D. none of these

Answer: C

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432. The sum of the intercepts made on the axes of coordinates by any tangent to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ is equal to

A. $\sqrt{a}$

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

C. a

D. $2a$

Answer: C

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433. If the normal to the curve $y = f(x)$ at the point $(3, 4)$ makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3) =$ (a) -1 (b) $-\frac{3}{4}$ (c) $\frac{4}{3}$ (d) 1

A. -1

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

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

D. 1

Answer: D

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

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

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

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

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

Answer: B

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435. The curves $x^3 - 3xy^2 = a$ and $3x^2y - y^3 = b$, where a and b are constants, cut each other at an angle of

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

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

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

D. none of these

Answer: C

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436. The two curves $x = y^2, xy = a^3$ cut orthogonally at a point. Then a^2 is equal to $\frac{1}{3}$ (b) 3 (c) 2 (d) $\frac{1}{2}$

A. $\frac{1}{3}$

B. 3

C. 2

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

Answer: D

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437. If $y = f(x)$ be the equation of the line touching the line $y = 2x + 3$ at $x = 2$, then

A. $f'(2) = 3$

B. $2f(2) = 7f'(2)$

C. $f(2) + f'(2) + f''(2) = 2$

D. none of these

Answer: B

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438. If the parabolas $y = x^2 + ax + b$ and $y = x(c - x)$ touch each other at the point (1,0), then $a + b + c =$

A. -1

B. 0

C. 1

D. none of these

Answer: B

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439. The equation of the tangent to the curve $y = x + \frac{4}{x^2}$, that is parallel to the x-axis, is (1) $y = 1$ (2) $y = 2$ (3) $y = 3$ (4) $y = 0$

A. $y = 2$

B. $y = 3$

C. $y=0$

D. $y=1$

Answer: B

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

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

B. velocity

C. $(\text{velocity})^2$

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

Answer: A

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441. If the velocity of a body moving in a straight line is proportional to the square root of the distance traversed, then it moves with

A. variable force

B. constant force

C. zero force

D. zero acceleration

Answer: B

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442. A spherical iron ball 10cm in radius is coated with a layer of ice of uniform thickness that melts at a rate of $50cm^3 / m \in$. When the thickness of ice is 5cm, then find the rate at which the thickness of ice decreases.

A. $\frac{5}{6\pi} cm / \min$

B. $\frac{1}{54\pi} cm / \min$.

C. $\frac{1}{18\pi} cm / \min$

D. $\frac{1}{36\pi} cm / \min$

Answer: C

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443. If f(x) satisfies the condition for Rolle's heorem on [3,5] then $\int_{3}^{5} f(x)$ dx equals

A. 2

B. -1

C. 0

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

Answer: D

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444. If $a+b+c=0,$ then, the equation $3ax^2+2bx+c=0$ has , in the interval (0,1).

A. at least one root

B. at most one root

C. no root

D. none of these

Answer: A

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445. If f(x) satifies of conditiohns of Rolle's theorem in [1,2] and f(x) is continuous in [1,2] then $\therefore \int_1^2 f'(x)dx$ is equal to

A. 3

B. 0

C. 1

D. 2

Answer: B

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446. 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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447. If x and y are the sides of two squares such that $y = x - x^2$, find the rate of the change of the area of the second square with respect to the first square.

A. $2x^2 + 3x$

B. $3x^2 + 2x - 1$

C. $2x^2 - 3x + 1$

D. $3x^2 + 2x + 1$

Answer: C

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448. If v is the velocity and f is the acceleration of a particle, at time t, such that $t = \frac{v^2}{2}$, then : $-\frac{df}{dt} =$

A. f^2

B. f^3

C. $-f^3$

D. f^2

Answer: B

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449. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. Two 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) $\sqrt{\frac{x^3}{8}}$

A. $\frac{3}{2}x^2$

B. $\frac{1}{2}\sqrt{x}^3$

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

D. πx^2

Answer: C

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450. If the path of a moving point is the curve $x = at, y = \sin$ at, then its acceleration at any instant

A. is constant

B. varies as its distance from x-axis

C. varies as its distance from y-axis

D. varies as its distance from the origin

Answer: C

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451. The position of a point in time t is given by $x = a + bt - ct^2, y = at + bt^2$. Its acceleration at time

t is

A. $b - c$

B. $b + c$

C. $2(b - c)$

D. $2\sqrt{b^2 + c^2}$

Answer: D

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452. Displacment x of a particle at time t is given by $x = At^2 + Bt + C$, where A,B,Care constants .If v is its velocity, then :$4Ax - v^2 =$

A. $4AC + B^2$

B. $4AC - B^2$

C. $2AC - B^2$

D. $2AC + B^2$

Answer: B

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453. A function is matched below against an interval, where it is supposed to be increasing. Which of the following pairs is incorrectly matched?

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454. The abscisssa of the points of the curve $y = x^3$ in the interval [-2,2], where the slope of the tangents can be obtained by mean value theorem for the interval [-2,2] , are

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

B. $\pm \sqrt{3}$

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

D. 0

Answer: A

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455. If the functio $f(x)^3 - 6x^2 + ax + b$ satisfies Rolle's theorem in the interval [1,3] and $f'\left(\frac{2\sqrt{3}+1}{\sqrt{3}}\right) = 0,$ then

A. -11

B. -6

C. 6

D. 11

Answer: D

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456. The perimeter of a sector is p. The area of the sector is maximum when its radius is

A. $\sqrt{p}$

B. $1/\sqrt{p}$

C. $p/2$

D. $p/4$

Answer: D

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457. A function $y = f(x)$ has a second order derivative $f(x) = 6(x - 1)$. If its graph passes through the point

$(2, 1)$ and at that 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

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458. Function $f(x) = x + \cot^{-1} x$ increasing in the interval

A. $(1, \infty)$

B. $(-1, \infty)$

C. $(-\infty, \infty)$

D. $(0, \infty)$

Answer: C

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459. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at $x = 2$ (b) $x = -2$ $x = 0$ (d) $x = 1$

A. $x = -2$

B. $x = 0$

C. $x = 1$

D. $x = 2$

Answer: D

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460. If $x + 4y = 14$ is a normal to the curve $y^2 = \alpha x^3 - \beta$ at (2,3), then the value of $\alpha + \beta$ is 9 (b) -5 (c) 7 (d) -7

A. 9

B. -5

C. 7

D. -7

Answer: C

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461. If a variable tangent to the curve $x^2y = c^3$ makes intercepts $a, bonx - andy - axes,$ respectively, then the value of a^2b is $27c^3$ (b) $\frac{4}{27}c^3$ (c) $\frac{27}{4}c^3$ (d) $\frac{4}{9}c^3$

A. $27c^3$

B. $\frac{4}{27}c^3$

C. $\frac{27}{4}c^3$

D. $\frac{4}{9}c^3$

Answer: C

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

A. 0

B. 1

C. 2

D. none of 3,4,..., 8, 9

Answer: D

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MULTIPLE CHOICE QUESTIONS (TEST YOUR GRASP - I : CHAPTER 12)

1. If the tangent to the curve $y = ax^2 + 3x + 7$, at the point $x = 6$, is parallel to X-axis, then : $a^=$

A. $-\frac{1}{4}$

B. $\frac{1}{4}$

C. 4

D. -4

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2. If the equation of the normal to the curve $y = ax^2 + 2x - 3, at = 1, isx + 6y = 7then : a =$

A. 1

B. 2

C. 3

D. 4

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3. Find the slope of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at $t = 2$.

A. $\tan^{-1}\left(\frac{7}{6}\right)$

B. $\tan^{-1}\left(\frac{5}{6}\right)$

C. $\tan^{-1}\left(\frac{6}{7}\right)$

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

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4. Inclination of the normal to the curve $xy = c^2$, at the point $x = c$, is

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

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

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

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

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5. Equations of the tangent and normal to the curve $y = 3\sqrt{x-1}$, at the point $x = 1$, are repectively.

A. $x = 1, x = 0$

B. $y = 0, y = 1$

C. $x = 0, y = 1$

D. $x = 1, y = 0$

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6. If lines T_1 and T_2 touch the curve $y = x^2 - 3x + 2$ at the points where the curve meets the X- axis, then

A. $T_1 || T_2$

B. $T_1 \perp T_2$

C. $m\angle(T_1, T_2) = 45^\circ$

D. they are coincident

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7. Equation of the tangent to the curve $4y = x^2 + 3x + 2$, which is parallel to X-axis , is

A. $16y + 1 = 0$

B. $8y + 1 = 0$

C. $4y + 1 = 0$

D. $2y + 1 = 0$

Answer: B

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8. If the line $y = 4x + 2$ touches the curve $y = a + bx + 3x^2$ at the point where it crosses the Y-axis, then : $(a, b) \equiv$

A. $(4, 2)$

B. $(-4, -2)$

C. $(2, 4)$

D. $(-2, 4)$

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9. Equation of the tangent to the curve

$\left(\frac{x}{a}\right)^{2009} + \left(\frac{y}{b}\right)^{2009} = 2$ at the point $x = a$ on it, is

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

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

C. $\frac{x}{a} + \frac{y}{b} = 2009$

D. $ax + by = 1$

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10. Any tangent to the curve $y = 1 - x^5 - 8x$ makes with the X-axis

A. an acute angle

B. an obtuse angle

C. a reflexive angle

D. a right angle

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11. $f(x) = 2x^3 - 18x^2 + 30x + 36$ has minimum value at x = ...

A. 1

B. -1

C. 5

D. -5

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12. Maximum value of $f(x) = x^3 - 9x^2 + 24x - 15$ is

A. 5

B. 4

C. 2

D. 1

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13. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at

$x = 2$ (b) $x = -2$ $x = 0$ (d) $x = 1$

A. $x = 2$

B. $x = -2$

C. $x = 0$

D. $x = 1$

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14. When x is positive, the minimum value of x^x is

A. e^e

B. $\frac{1}{e^e}$

C. $e^{-1/e}$

D. $e^{1/e}$

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15. If area of a rectangle is k^2 , where $k > 0$, then its minimum perimeter is

A. $4k$

B. $2k^2$

C. $4k^2$

D. k

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16. If minima of $f(x)=\frac{a}{x}+bx$ at x = 2 is 2, then $(a, b) \equiv \ldots$

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

B. $(2, 2)$

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

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

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17. Total cost of producing x items is $Rs\frac{x^2}{4} + 25x - 50$ and selling perice of each is $Rs100 - \frac{x}{4}$. The output for maximum profit must be

A. 25

B. 75

C. 50

D. 100

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18. If volume of a box, having square base and open top, is $108m^3$, then its minimum area is

A. $108m^2$

B. $18m^2$

C. $81m^2$

D. $801m^2$

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19. The perimeter of a sector is p. The area of the sector is maximum when its radius is

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

B. $\frac{1}{\sqrt{p}}$

C. $\sqrt{p}$

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

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MULTIPLE CHOICE QUESTIONS (TEST YOUR GRASP - II : CHAPTER 12)

1. If $S = 16 + 192t - t^3$, then distance tavelled by the particle before coming to rest is

A. 1040 units

B. 520 units

C. 260 units

D. 2080 units

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2. The distances moved by a particle in time t seconds is given by $s = t^3 - 6t^2 - 15t + 12$. The velocity of the particle when acceleration becomes zero, is

A. $15 \text{units} / \text{sec}$

B. $-27 \text{units} / \text{sec}$

C. $27 \text{units} / \sec$

D. $15 \text{units} / \sec$

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3. A stone thrown vertically upwards rises S ft in t seconds where $S = 112t - 16t^2$. The maximum height reached by the stone is

A. $192 ft$

B. $190 ft$

C. $196 ft$

D. $392 ft$

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4. If displacement x at time t is $x = \sqrt{1 + t^2}$, then acceleration is

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

B. $\frac{1}{x^2}$

C. $\frac{1}{x^3}$

D. x^3

Answer: C

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5. If the circumference of a circle at the rate of $0.2cm/\sec$, then, when the radius is 8cm, its area is changing at the rate of

A. $0.8cm^2/\sec.$

B. $0.4cm^2/\sec.$

C. $1.6cm^2/\sec.$

D. $3.2cm^2/\sec.$

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6. A stone is dropped into a quiet pond and waves spread in the form of concentric circles outward from the point where it strikes at a speed of $4 \text{inch} / \text{sec}$. When the radius of the wave-ring is 3 ft ,the enclosed area is increasing at the rate of

A. $2\pi sq.\ ft.\ / \text{sec.}$

B. $\pi sq.\ ft / \text{sec.}$

C. $3\pi sq.\ ft / \text{sec.}$

D. $4\pi sq.\ ft / \text{sec.}$

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7. Perimeter of square increases at the rate of $0.4cm/\sec.$ When the side is 20 cm, its area increases at the rate of

A. $0.4cm^2/\sec.$

B. $0.8cm^2/\sec.$

C. $0.2cm^2/\sec.$

D. $4cm^2/\sec.$

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8. Each side of an equilateral triangle increases at a uniform rate of $0.5cm/\sec.$ When each side is 40 cm , its area is increasing at the rate of

A. $5\sqrt{3}cm^2/\sec$

B. $10\sqrt{3}cm^2/\sec$

C. $20\sqrt{3}cm^2/\sec$

D. $15\sqrt{3}cm^2/\sec$

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9. If the surface area of a cube increases at the rate of $0.6cm^2/\sec$, then, when the side is 4 cm , volume of the cube is increasing at the rate of

A. $6c.c./\sec.$

B. $60 c.\ c.\ / \sec.$

C. $0.6 c.\ c.\ / \sec.$

D. $0.06 c.\ c.\ / \sec.$

Answer: C

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10. If V denotes the volume and S is the surface area of a sphere. If radius of sphere is 2 cm, then the rate of change of V w.r.t. S is

A. 1

B. 2

C. 3

D. 4

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11. Water is poured into an inverted cone of semi-vertical angle 30° at the rate of $2cu. ft / \min$ .When the depth of water in the cone is 1 foot, the surface of water in the cone is rising at the rate of

A. $\frac{\pi}{6} ft. / \min$.

B. $\frac{6}{\pi} ft. / \min$.

C. $6\pi ft. / \text{sec.}$

D. $\frac{2}{\pi}ft. \ / \ \min$.

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12. A ladder 10 m long leans against a house. When its foot is 6 m from the house and moving away at the rate of $0.5m/\sec.$, its top is sliding down at the rate of

A. $\frac{3}{8}m/\sec.$

B. $\frac{8}{3}m/\sec.$

C. $\frac{4}{3}m/\sec.$

D. $\frac{3}{4}m/\sec.$

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13. If $y = (\log x) - \frac{2}{x}, x = \frac{1}{2}, \delta x = 10^{-8}$, then $\delta y \approx$ ...

A. 10^{-9}

B. 10^{-10}

C. 10^{-6}

D. 10^{-7}

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14. If $1^{\circ} = 0.0174^{c}$, then $\tan(45^{\circ}50') \approx \dots$

A. 10.29

B. 1.029

C. 102.9

D. 1029

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15. If diameter of a sphere is 2 cm with error 0.082 mm, then approximate error in its volume is

A. $0.0164\pi c. c.$

B. $164\pi c. c.$

C. $1.64\pi c.\ c.$

D. $16\pi c.\ c.$

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16. If a wire of length l, with error δl, is bent into an equilateral triangle , then approximate error in area of the triangle is

A. $\dfrac{l.\ \delta l}{4\sqrt{3}}$

B. $\dfrac{l.\ \delta l}{\sqrt{3}}$

C. $\dfrac{l.\ \delta l}{6\sqrt{3}}$

D. $\dfrac{l.\ \delta l}{2\sqrt{3}}$

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17. if radius of a sphere is r with error $\delta r, \text{ and } S$ is its surface area, thn approximate error in

A. $2S\delta r$

B. $3S\delta r$

C. δr

D. $S\delta r$

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18. If $1^\circ = 0.018^c$, then $\sin^2(45^\circ 2') \approx$ ...

A. 0.6006

B. 0.5226

C. 0.5306

D. 0.5006

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19. A point P moves along the curve $y = x^3$. If its abscissa is increasing at the rate of 2 units/ sec, then the rate at which the slop of the tangent at P is increasing when P is at $(1, 1)$, is

A. 12 units /sec

B. 24 units/sec

C. 8 units /sec

D. s

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