MATHS

BOOKS - MTG WBJEE MATHS (HINGLISH)

APPLICATION OF DERIVATIVES

Wb Jee Workout Category 1 Single Option Correct Type 1 Mark

1. If the rate of increase of the radius of a circle is 5 cm/sec, then the rate of increase of its area, when the radius is 20 cm, will be

A. 10π

B. 20π

C. 200π

D. 400π

Answer: C

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2. Maximum value of the function $f(x) = \frac{x}{8} + \frac{2}{x}$ on the interval [1,6] is

A. 1

B. $\frac{9}{8}$

C. $\frac{13}{12}$

D. $\frac{17}{8}$

Answer: D

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3. If $y = 2x^3 - 2x^2 + 3x - 5$, then for $x = 2$ and $\Delta x = 0.1$ value of Δy is

A. 2.002

B. 1.9

C. 0

D. 0.9

Answer: B

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4. The function f(x)= $\tan^{-1} x + x$ increases in the interval

A. $(1, \infty)$

B. $(-1, \infty)$

C. $(0, \infty)$

D. $(-\infty, \infty)$

Answer: D

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5. The interval in which the function f(x)=sin x-cos x -ax +b decreases for all real values of x is given by

A. $a \geq \sqrt{2}$

B. $a \geq 1$

C. $a < \sqrt{2}$

D. $a < 1$

Answer: A

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6. The line, which is parallel to X-axis and crosses the curve $y = \sqrt{x}$ at an angle 45°, is

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

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

C. y=1

D. y=4

Answer: B

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7. The function f(x) = $\frac{x}{\log x}$ increases on the interval

A. $(0, \infty)$

B. $(0, e)$

C. (e, ∞)

D. none of these

Answer: C

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8. At $x = \frac{5\pi}{6}$, $f(x) = 2\sin 3x + 3\cos 3x$ is

A. maximum

B. minimum

C. 0

D. none of these

Answer: D

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9. The function f(x)=ax+b is strictly increasing for all real x is

A. $a > 0$

B. $a < 0$

C. a=0

D. $a \leq 0$

Answer: A

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10. Find the values of b for which the function $f(x) = \sin x - bx + c$ is a decreasing function on R.

A. $b < 1$

B. $b \geq 1$

C. $b > 1$

D. $b \leq 1$

Answer: C

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11. The coordinates of a moving particle at any time t are given by x = ct and y = bt. The speed of the particle at time t is given by

A. 2t(c-b)

B. $\sqrt{(c^2+b^2)}$

C. $2t\sqrt{(c^2+b^2)}$

D. $2t\sqrt{(c^2+b^2)}$

Answer: B

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12. Let P(x) $= a_0 + a_1x^2 + a_2x^4 + \cdots + a_nx^{2n}$ with all $a_i > 0$, i=0,1,2,3, $\cdots$,n . Then P(x) has

A. neither maximum nor minimum

B. only one maximum

C. only one minimum

D. one maximum and one minimum

Answer: C

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13. The distance covered by a particle in t second is given by $x = 3 + 8t - 4t^2$. After $1s$ its velocity will be

A. 0 unit/second

B. 3 units/second

C. 4 units/second

D. 7 units/second

Answer: A

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14. If the normal to the curve $y = f(x)$ at the point $(1, 2)$ makes an angle $3\pi/4$ with the positive x-axis, then $f'(1)$ is

A. 1

B. -1

C. 0

D. 2

Answer: A

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15. If the rate of increase of $\frac{x^2}{2} - 2x + 5$ is twice the rate of decrease of it then x is

A. 2

B. 3

C. 4

D. 1

Answer: A

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16. The angle fomed by the abscissa and the tangent to the parabola $y = x^2 + 4x - 17$ at the point $\left(\frac{5}{2}, -\frac{3}{4}\right)$ is

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

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

C. $\tan^{-1} 7$

D. none of these

Answer: D

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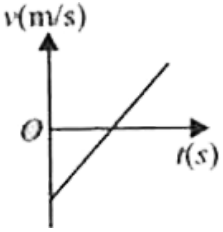
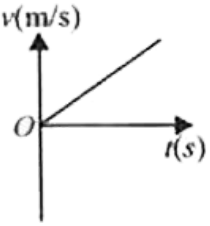
17. A particle moves along x-axis in such a way that its r-coordinate varies with time't according to the equation x= $(8 - 4t + 6t^2)$ metre. The velocity of the particle will vary with time according to the graph

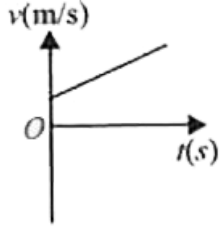
A.



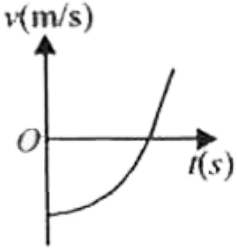
B.



C.



D.



Answer: A

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18. The point in the interval $(0, 2\pi)$ where $f(X) = e^x$ sinx has maximum slope is

A. $\pi/4$

B. $\pi/2$

C. π

D. $3\pi/2$

Answer: B

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19. If a differentiable function f(x) has a relative minimum at x=0, then the function g = f(x) + ax + b has a relative minimum at x =0 for

A. all a and all b

B. all b if a =0

C. all b $>$ 0

D. all$a > 0$

Answer: B

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20. If f(x) = $\begin{cases} 0 & \text{for} x = 0 \\ x - 3 & \text{for} x > 0 \end{cases}$ then function f(x) is

A. increasing when $x > 0$

B. strictly increasing when x $>$ 0

C. strictly increasing at x =0

D. not continuous at x =0 and so it is not increasing when x > 0

Answer: A

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21. The two curves $x^3 - 3xy^2 + 5 = 0$ and $3x^2y - y^3 - 7 = 0$

A. cut at right angle

B. touch each other

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

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

Answer: B

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22. The displacement y (in metres) of a body varies with time t (in seconds) as $y = \frac{-2}{3}t^2 + 16t - 12$. How long does the body take to come to rest ?

A. 16 sec

B. 12 sec

C. 10 sec

D. 8sec

Answer: B

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23. A particle is projected vertically upward and is at a height h after t_1 seconds and again after t_2 seconds

A. $h = \mathrm{g}t_1t_2$

B. $h = \frac{1}{2}\mathrm{g}t_1t_2$

C. $h = \frac{2}{g}t_1t_2$

D. $h = \sqrt{\mathrm{g}t_1t_2}$

Answer: B

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24. If the graph of a diffierentiable function y =f(x) meets the lines y = -1 and y = 1, then the graph

A. mects the line y =0 at least once

B. meets the line y=0 at least twice

C. meets the line y= 0 at least thrice

D. doest not meet the line y = 0

Answer: A

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25. The angle at which the curve $y = (a+1)e^{ax}$ intersects y-axis is

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

B. $\sin^{-1}\left(\frac{1}{\sqrt{1+a^4}}\right)$

C. $\cot^{-1}(a^2+a)$

D. $\sec^{-1}\sqrt{1+a^4}$

Answer: C

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26. The distance betwcen the point (1, 1) and the tangent to the curve y= $e^{2x} + x^2$ drawn from the point x =0 is

A. $\frac{1}{\sqrt{5}}$

B. $\frac{-1}{\sqrt{5}}$

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

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

Answer: C

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27. The minimum value of $f(x) = e^{(x^4 - x^3 + x^2)}$ is

A. e

B. $-e$

C. 1

D. -1

Answer: C

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28. Critical points of the function f(x)= $(x-3)^{2/3}(3x-1)$

A. $\frac{31}{15}, 1$

B. $\frac{31}{15}, 3$

C. $\frac{31}{15}, 0$

D. none of these

Answer: D

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29. The function f(x) =xe^{1-x}

A. strictly increases in the interval (1/2, 2)

B. increases in the interval $(0, \infty)$

C. decreases in the interval (0, 2)

D. strictly decreases in the interval $(1, \infty)$

Answer: D

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30. The value of a so that the sum of the squares of the roots of the equations $x^2 - (a-2)x - a + 1 = 0$ assume the least value is

A. 2

B. 0

C. 3

D. 1

Answer: D

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Wb Jee Workout Category 2 Single Option Correct Type 2 Marks

1. A particle is moving in a straight line. At time t, the distance between the particle from its starting point is given by $x = t - 9t^2 + t^3$. Its acceleration will be zero at

A. t=1 unit time

B. t=2 unit time

C. t=3 unit time

D. t=4 unit time

Answer: B

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2. The function f(x)= cos $\left(\frac{\pi}{x}\right)$ is decreasing in the interval

A. $(2n+1, 2n), n \in N$

B. $\left(\frac{1}{2n+1}, 2n\right), n \in N$

C. $\left(\frac{1}{2n+2}, \frac{1}{2n+1}\right), n \in N$

D. none of these

Answer: D

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3. An extremum value of the function $f(x) = \left(\sin^{-1} x\right)^3 + \left(\cos^{-1} x\right)^3 (-1 \leq x \leq 1)$ is

A. $\frac{\pi^3}{16}$

B. $\frac{\pi^3}{32}$

C. $\frac{\pi^3}{8}$

D. $\frac{7\pi^3}{8}$

Answer: B

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4. The function f(x) $=e^{ax}+e^{-ax}, a>0$ is monotonically increasing for

A. $-1<x<1$

B. $x<-1$

C. $x > -1$

D. $x > 0$

Answer: D

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5. A ladder 5 m in length is resting against vertical wall. The bottom of the ladder is pulled along the ground away from the wall at the rate of 1.5m/sec. The length of the highest point of the ladder when the foot of the

ladder 4.0 m away from the wall decreases at the rate of

A. 2 m/sec

B. 3 m/sec

C. 2.5 m /sec

D. 1.5 m/sec

Answer: A

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6. Three normals drawn to the parabola y^2 = 4x from the point (c, 0) are real and diferent if

A. c=0

B. c=1

C. c=2

D. c=3

Answer: D

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7. For what values of x the function f(x)= $x^4 - 4x^3 + 4x^2 + 40$ is monotonically increasing ?

A. $0 < x < 1$

B. $1 < x < 2$

C. $2 < x < 3$

D. $4 < x < 5$

Answer: B

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

A. 3 m/sec

B. 5 m/sec

C. -5 m/sec

D. 4 m/sec

Answer: C

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9. The number of possible tangents which can be drawn to the curve $4x^2 - 9y^2 = 36,$ which are perpendicular to the straight line $5x + 2y - 10 = 0$, is zero (b) 1 (c) 2 (d) 4

A. $5(y-3) = 4\left(x - \frac{\sqrt{11}}{2}\right)$

B. $2x - 5y + 10 - 12\sqrt{3} = 0$

C. $2x - 5y - 10 + 12\sqrt{3} = 0$

D. none of these

Answer: D

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10. The point on the curve $y^2 = x$ the tangent at which makes an angle 45° with X-axis is

A. (0,0)

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

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

D. (2,4)

Answer: C

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11. Let y = $a(1-\cos\theta)$, $x = a(\theta - \sin\theta)$, then y regarded as a function of x is maximum when x equals to

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

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

C. (π)

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

Answer: C

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12. Areaof a square plate is increasing at the uniform rate of 2 cm^2/sec. Find the rate at which the perimeter is increasing when the side of the square is 16 cm long.

A. 4 cm /sec

B. $\frac{1}{4}$ cm /sec

C. 2 cm /sec

D. $\frac{1}{2}$ cm /sec

Answer: B

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13. A square piece of tin of side 18 cm is to be made into a box without top by cutting a square from each corner and folding up the flaps to form a box. What should be the side of the square to be cut off so that the volume of

the box is maximum? Also, find the maximum volume.

A. 2 cm ,430 cm^3

B. 5 cm ,425 cm^3

C. 3 cm , 432 cm^3

D. 3 cm ,423 cm^3

Answer: C

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

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

B. $3, \pm \frac{2}{3}\Big)$

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

D. $\left(2, \pm \frac{8}{3}\right)$

Answer: A

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15. A beam of length l is supported at one end. If W is the uniform load per unit length, the bending moment M at a distance x from the end is given by $M = \frac{1}{2}lx - \frac{1}{2}Wx^2$. Find the point on the beam at which the bending moment has the maximum value.

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

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

C. $\frac{l}{2W}$

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

Answer: C

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Wb Jee Workout Category 3 One Or More Than One Option Correct Type 2 Marks

1. Let f(x)= $\int_0^x \frac{\cos t}{t} dt, (x > 0)$, then for x = (2n+1) $\frac{\pi}{2}$ f(x) has

A. maxima when n = 0, 2,4, 6, ..

B. neither maxima nor minima when n = - 1, -3,-5,.....

C. minima when n =0,2,4,6,.....

D. none of these

Answer: A

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2. N Characters of information are held on magnetic tape, in batches of x characters each, the batch processing time is $\alpha + \beta x^2$seconds,

α and β are constants. The optical value of x for fast processing is

A. $\frac{\alpha}{\beta}$

B. $\frac{\beta}{\alpha}$

C. $\sqrt{\frac{\alpha}{\beta}}$

D. $\sqrt{\frac{\beta}{\alpha}}$

Answer: C

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3. The angle at which the circle $x^2 + y^2 = 16$ can be seen from the point $(8, 0)$ is

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

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

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

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

Answer: C

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4. If the tangent at $(1, 1)$ on $y^2 = x(2 - x)^2$ meets the curve again at P, then find coordinates of P.

A. (2,2)

B. $(-1, -2)$

C. $\left(\frac{9}{4}, \frac{3}{8}\right)$

D. none of these

Answer: C

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5. If $x^2 + y^2 = 1$ then minimum and maximum values of (x+y) are

A. $-\sqrt{2}, \sqrt{2}$

B. $-1, 1$

C. $-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

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

Answer: A

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6. Let the parabolas y= $x^2 + ax + b$and y =x(c-x) touch cach other at point (1,0). Then

A. a=-3

B. b=2

C. c=2

D. b+c=3

Answer: A::B::D

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7. The tangent to the curve $y = x - x^3$ at a point p meets the curve again at Q. Prove that one point of trisection of PQ lies on the Y-axis. Find the locus of the other points of trisection.

A. one point of trisection of PQ lics on y-axis.

B. one point of trisection of PQ lies on x-axis.

C. the locus of other point of trisection is y =x-$3x^3$

D. the locus of other point of trisection is

$y=x-5x^3$

Answer: A::B::D

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8. For the curve $x= 2a \sin t+ a \sin t \cos^2 t$, $y=-a \cos^3 t$

A. normal is inclined at an angle $\frac{\pi}{2}+1$ with x-axis.

B. nomal is inclined at an angle t with r-axis.

C. portion of normal contained between the co-ordinate axes has the maximum value. co-ordinate axes is equal to 2a

D. portion of normal contained between the co-ordinate axes is equal to 4a.

Answer: A::C

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9. The curve $y = ax^3 + bx^2 + cx$ is inclined at 45° to x-axis at $(0, 0)$ but it touches x-axis at $(1, 0)$, then

A. f'(1)=0

B. f"(1)=2

C. f"'(2)=12

D. f(2)=2

Answer: A::B::D

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10. A box with a square base is to have an open top. The surface area of the box is 192 sq. cm. What should be its dimensions in order that the volume is as large as possible ?

A. side of the square base is 8 cm and height of the box is 4 cm

B. side of the square base is 7 cm and height of the box is 5 cm

C. side of the square base is 6 cm and height of the box is 4 cm

D. side of the square base is 8 cm and height of the box is 5 cm

Answer: A

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11. Prove that the minimum value of $\frac{(a+x)(b+x)}{(c+x)} a, b > c, x \succ c$ is $\left(\sqrt{a-c}+\sqrt{b-c}\right)^2$

A. $x = c + \sqrt{(c-a)(c-b)}$

B. $x = -c + \sqrt{(c-a)(c-b)}$

C. $x = c - \sqrt{(c-a)(c-b)}$

D. $x = -c - \sqrt{(c-a)(c-b)}$

Answer: B

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12. The combined resistance R of two resistors R_1 and R_2 where $R_1, R_2 > 0$ is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

If $R_1 + R_2 = C$ (constant), show that the

maximum reistance R is obtained by chossing

$R_1 = R_2$

A. $R_1 = \sqrt{R_2}$

B. $R_1 = 1 + R_2$

C. $R_1 = R_2$

D. $R_1 = \frac{1}{R_2}$

Answer: C

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13. If L_T, L_N, L_{ST} and L_{SN} denote the lengths of tangent, normal, sub-langent and sub-normal respectively, ofa curve y =f(x) at a point P (2009, 2010) on it, then

A. $\frac{L_{ST}}{2010} = \frac{2010}{L_{SN}}$

B. $\left| \frac{LT}{L_N} \sqrt{\frac{L_{SN}}{L_{ST}}} \right| = 1$

C. $1 - L_{ST} L_{SN} = \frac{2000}{2010}$

D. $\left(\frac{L_T + L_N}{L_T - L_N} \right)^2 = \frac{L_{ST}}{S_{SN}}$

Answer: A::B

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14. The coordinates of the point on the curve $\left(x^2+1\right)$(y-3)=x where a tangent to the curve has the greatest slope are given by

A. $\left(\sqrt{3}, 3+\sqrt{3}/4\right)$

B. $\left(-\sqrt{3}, 3-\sqrt{3}/4\right)$

C. (0,3)

D. none of these

Answer: C

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15. Equation of a line which is tangent to both the curves $y = x^2 + 1$ and $y = -x^2$ is

A. $y = \sqrt{2}x - \frac{1}{2}$

B. $y = \sqrt{2}x + \frac{1}{2}$

C. $y = -\sqrt{2}x + \frac{1}{2}$

D. $y = -\sqrt{2}x - \frac{1}{2}$

Answer: B::C

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Wb Jee Previous Years Questions Category 1 Single Option Correct Type 1 Mark

1. For the curve $x^2 + 4xy + 8y^2 = 64$` the tangents are parallel to the x-axis only at the points

A. $(0, 2\sqrt{2}$ and $(0, -2\sqrt{2})$

B. (8,-4) and (-8,4)

C. $(8\sqrt{2}, -2\sqrt{2})$ and $(-8\sqrt{2}, 2\sqrt{2})$

D. (8,0) and (-8,0)

Answer: B

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2. If f(x) $=e^x(x-2)^2$ then

A. f is increasing in $(-\infty, 0)$ and $(2, \infty)$

an decreasing in (0,2)

B. f is increasing in $(-\infty, 0)$ and

decreasing in $(0, \infty)$

C. f is increasing in $(2, 00)$ and decreasing in $(\infty, 0)$

D. f is increasing in (0,2) and decreasing in $(-\infty, 0)$ and $(2, \infty)$

Answer: A

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3. Let exp (x) denotes the exponetial function e^x . If f(x) = exp$\left(x^{1/x}, x > 0\right.$ then the minimum value of f in the interval [2,5] is

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

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

C. $\exp\left(5^{\frac{1}{5}}\right)$

D. $\exp\left(e^{\frac{2}{e}}\right)$

Answer: C

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4. Let f(x) =sinx $+2\cos^2 x$ $\frac{\pi}{4} \leq x \leq \frac{3\pi}{4}$. Then f attains its

A. minimum at $x = \frac{\pi}{4}$

B. maximum at x=$\frac{\pi}{2}$

C. minimum at $x = \frac{\pi}{2}$

D. maximum at x $= \sin^{-1}\left(\frac{1}{4}\right)$

Answer: C

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5. Let f(x) be a differentiable function in [2, 7] . If f(2) = 3 and f'(x) $\leq$ 5 for all x in (2, 7), then the maximum possible value of f (x) at x=7 is

A. 7

B. 15

C. 28

D. 14

Answer: C

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6. Suppose that the equation $f(x) = x^2 + bx + c = 0$ has two distinct real roots α and β. The angle between the tangent

to the curve $y = f(x)$ at the point $\left(\frac{\alpha+\beta}{2}, f\left(\frac{\alpha+\beta}{2}\right)\right)$ and the positive direction of the x-axis is

A. 0°

B. 30°

C. 60°

D. 90°

Answer: A

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7. The minimum value of $\cos\theta + \sin\theta + \frac{2}{\sin 2\theta} f$ or $\theta \varepsilon \left(0, \frac{\pi}{2}\right)$ is (A) $2 + \sqrt{2}$ (B) 2 (C) $1 + \sqrt{2}$ (D) $2\sqrt{2}$

A. $2 + \sqrt{2}$

B. 2

C. $1 + \sqrt{2}$

D. $2\sqrt{2}$

Answer: A

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8. The least value of $2x^2 + y^2 + 2xy + 2x - 3y + 8$ for real number x and y is

A. 2

B. 8

C. 3

D. 1

Answer:

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9. Let $y = e^{x^2}$ and $y = e^{x^2}$ sin x be two given curves . Then the angle between the tangents to the curves at any point of their intersection is

A. 0

B. π

C. $\pi/2$

D. $\pi/4$

Answer: A

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10. A particle starts moving from rest from a fixed point in a fixed direction. The distance s from the fixed point at a time t is given by s = $t^2 + at - b + 17$, where a, b are real numbers. It the particle comes to rest after 5 sec at a distance of s = 25 units from the fixed point, then values of a and b are respectively

A. 10,-33

B. $-10, \ -33$

C. $-8, 33$

D. $-10, 33$

Answer: B

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11. Time period T of a simple pendulum of length l is given by $T = 2\pi\sqrt{\frac{l}{g}}$. If the length is increased by 2% then an approximate change in the time period is

A. 0.02

B. 1%

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

D. none of these

Answer: B

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12. The chord of the curve $y = x^2 + 2ax + b$ joining the points where $x = \alpha$ and $x = \beta$,

isparallel to the tangent to the curve at abscissa $x =$

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

B. $\frac{2a+b}{3}$

C. $\frac{2\alpha+\beta}{3}$

D. $\frac{\alpha+\beta}{2}$

Answer: D

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13. Let f(x) $= x^{13} + x^{11} + x^9 + x^7 + x^5 + x^3 + x + 19.$

The f(x) =0 has

A. 13 real roots

B. only one positive and only two negative real roots

C. not more than one real root

D. has two positive and one negative real root

Answer: C

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14. The law of motion of a body moving along a straight line is $x = \frac{1}{2}vt$, x being its distance from a fixed point on the line at time t and v is its velocity there. Then

A. accelerationS varies directly with x

B. acceleration f varies inverscly with x

C. acceleration f is constant

D. acceleration f varies directly with t

Answer: C

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15. If the radius of a spherical balloon increases by 0.1% then its volume increases approximately by

A. 0.2%

B. 0.3%

C. 0.4%

D. 0.05%

Answer: B

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Wb Jee Previous Years Questions Category 2 Single Option Correct Type 2 Marks

1. A family of curves is such that the length intercepted on the y-axis between the origin

and the tangent at a point is three times the ordinate of the point of contact. The family of curves is

A. xy, =c,c is a constant

B. xy^2 =c,c is a constant

C. x^2y = c, c is a constant

D. x^2y^2 = c,c is a constant

Answer: C

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2. F(x)=$\int_0^x \frac{\cos t}{(1+t^2)} dt 0 \leq x \leq 2\pi$. Then

A. F is increasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$

B. F is increasing in $(0, \pi)$ and decreasing in $(\pi, 2\pi)$.

C. F is increasing in $(\pi, 2\pi)$ and decreasing in $(0, \pi)$

D. F is increasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$ and decreasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

Answer: D

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3. A particle starting from a point A and moving with a positive constant acceleration along a straight line reaches another point B in time T. Suppose that the initial velocity of the paticle is u $>$ 0 and P is the midpoint of the line AB. If the velocity of the particle at point P is ν_1, and if the velocity at time T/2 is ν_2, then

A. $\nu_1 = \nu_2$

B. $\nu_1 > \nu_2$

C. $\nu_1 < \nu_2$

D. $\nu_1 = \frac{1}{2}\nu_2$

Answer: B

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4. The points of the ellipse $16x^2 + 9y^2 = 400$ at which the ordinate decreases at the same rate at which the abcissa increases is

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

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

C. $\left(\frac{1}{16}, \frac{1}{9}\right)$ and $\left(-\frac{1}{16}, \frac{1}{9}\right)$

D. $\left(\frac{1}{16}, -\frac{1}{9}\right)$ and $\left(-\frac{1}{16}, \frac{1}{9}\right)$

Answer: A

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5. The value of K in order that $f(x) = \sin x - \cos x - Kx + 5$ decreases for all positive real value of x is given by

A. $k < 1$

B. $K \geq 1$

C. $K > \sqrt{2}$

D. $K < \sqrt{2}$

Answer: C

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6. A ladder 20 ft long leans against a vertical wall. The top end slides downwards at the rate of 2 ft per second. The rate at which the lower

and moves on a horizontal floor when it is 12 ft from the wall is

A. $\frac{8}{3}$

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

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

D. $\frac{17}{4}$

Answer: A

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7. The normal to the curve $y = x^2 - x + 1$ drawn at the points with the abscissa $x_1 = 0, x_2 = -1$ and $x_3 = \frac{5}{2}$

A. are parallel to each other

B. are pair wise perpendicular

C. are concurrent

D. are not concurrent

Answer: C

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8. The equation x logx =3-x

A. has no root in (1, 3)

B. has exactly one root in (1, 3)

C. $x \log x - (3 - x) > 0$in [1,3]

D. x log x-(3-x) < 0 in [1,3]

Answer: B

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9. A point is in motion along a hyperbola $y = \frac{10}{x}$ so that its abscissa x increases uniformly at a rate of l unit per second. Then, the rate of change of its ordinate, when the point passes through (5, 2)

A. increases at the rate of $\frac{1}{2}$ unit per second

B. decreases at the rate of $\frac{1}{2}$ unit per second

C. decreascs at the rate of $\frac{2}{5}$ unit per second

D. increases at the rate of $\frac{2}{5}$ unit per second

Answer: C

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Wb Jee Previous Years Questions Category 3 One Or More Than One Option Correct Type 2 Marks

1. The angle of intersection between the curves

$y = [|\sin x| + |\cos x|]$ and $x^2 + y^2 = 10$,

where $[x]$ denotes the greatest integer $\leq x$, is

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

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

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

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

Answer: A::B

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2. If the straight line (a- 1)x - by + 4 =0 is normal to the hyperbola xy = 1 then which of the following does not hold?

A. $a > 1, b > 0$

B. $a > 1, b < 0$

C. $a < 1, b < 0$

D. $a < 1, b > 0$

Answer: B::D

Watch Video Solution

3. If $f(x)$ is function such that $f(x) = (z-1)^2(4-x)$, then

A. f(0) =0

B. f(x) is increasing in (0,3)

C. x=4 is a critical point of f(x)

D. f(x) is decreasing in (3,5)

Answer: B::C

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4. If the tangent to $y^2 = 4ax$ at the point $(at^2, 2at)$, where $|t| > 1$ is a normal to $x^2 - y^2 = a^2$ at the point $(a\sec\theta, a\tan\theta)$, then

A. $t = -\cos ec\theta$

B. $t = -\sec\theta$

C. $t = 2\tan\theta$

D. $t = 2\cot\theta$

Answer: A::C

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5. If the line ax + by + c =0, ab $\neq$ 0, is a tangent to the curve xy =1-2x, then

A. $a > 0, b < 0$

B. $a > 0, b > 0$

C. $a < 0, b > 0$

D. $a < 0, b < 0$

Answer: B::D

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6. Two particles move in the same straight line starting at the same moment from the same point in the same direction. The first moves with constant velocity u and the second starts from rest with constant acceleralion f . Then

A. they will be at he greatest distance at the end of time $\frac{u}{2f}$ from the start

B. they will be at the greatest distance at the end of time $\frac{u}{f}$ from the start

C. their greatest distance is $\frac{u^2}{2f}$

D. their greatest distance is $\frac{u^2}{f}$

Answer: B::C

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7. A particle is in motion along a curve $12y=x^3$. The rate of change of its ordinate exceeds that of abscissa in

A. $-2 < x < 2$

B. $x = \pm 2$

C. $x < -2$

D. $x > 2$

Answer: C::D

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8. Let f(x) = cos $\left(\frac{\pi}{x}\right) x \neq 0$ then assuming k as an integer ,

A. f(x) increase in the interval

$$\left(\frac{1}{2k+1}, \frac{1}{2k}\right)$$

B. f(x) decreases in the interval

$$\left(\frac{1}{2k+1}, \frac{1}{2k}\right)$$

C. f(x) decrease in the interval

$$\left(\frac{1}{2k+2}, \frac{1}{2k+1}\right)$$

D. f(x) increases in the interval

$$\left(\frac{1}{2k+2}, \frac{1}{2k+1}\right)$$

Answer: A::C

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9. Two particles A and B move from rest along a straight line with constant accelerationsfand h respectively.If A takes m seconds more than B and describes n units more than that of B acquiring the same speed then

A. $(f+h)m^2 = fhn$

B. $(f-fh)m^2 = fhn$

C. $(h-f)n = \frac{1}{2}fhm^2$

D. $\frac{1}{2}(f+h)n = fhm^2$

Answer: C

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10. Letfand g be differentiable on the interval I and let a, $b \in I, a < b$. Then

A. If f(a) =0 =f(b), the equation f"(x) +f(x)g'(x) = 0 is solvable in (a, b)

B. If f(x)= 0 -f(b), the equation f'(x)+f(x)g'(x) =0 may not be solvable in (a, b).

C. If $g(a) = 0 = g(b)$, the equation $g'(x) + kg(x) = 0$ is solvable in $(a, b), k \in R$.

D. If $g(a) = 0 = g(b)$, the equation $g'(x) + kg(x) = 0$ more than may not be solvable in $(a, b), k \in R$.

Answer: A::C

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11. Consider the function f(x) = $\frac{x^3}{4} - \sin \pi x + 3$

A. f(x) does not attain value within the interval [-2,2]

B. f(x) takes on the value $2\frac{1}{3}$ in the interval $[-2, 2]$

C. f(x) takes on the value $3\frac{1}{4}$ in the interval [-2,2]

D. f(x) takes no value no value p $1 < p < 5$

in the interval [-2,2]

Answer: B::C

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