MATHS

BOOKS - JMD MATHS (PUNJABI ENGLISH)

Appilications of Derivative

Exercise

1. If side of a square is increasing at the rate of 1.5 cm/sec, then the rate of change of its

perimeter is :

A. 1.5 cm/sec

B. 3 cm/sec

C. 4.5 cm/sec

D. 6.0 cm/sec

Answer:

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2. The point where the tangent to the curve $y = x^2 - 4x + 5$ is parallel to x-axis, is :

A. (2,1)

B. (1,2)

C. (2,4)

D. (4,5)

Answer:

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3. The interval in which the function $f(x) = 2x^2 + 4x - 5$ is strictly increasing is

A. $(-\infty, 1)$

B. $(-1, \infty)$

C. (2,4)

D. None of these

Answer:

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4. Which of the following function is strictly decreasing in $\left(0, \frac{\pi}{2}\right)$?

A. cos x

B. cos 2x

C. cos 3x

D. tan x

Answer:

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5. The slope of normal to the curve $y = x^2 + 3$ at x=1 is

A. 2

B. $-\frac{1}{3}$

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

D. None of these

Answer:

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6. The value of x for which function sin 2x attains its maximum is :

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

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

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

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

Answer:

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7. For what value of x, slope of the tangent to the curve $y = x^3 + x + 1$ is 10.

A. 3

B. -3

C. $\pm\sqrt{3}$

D. None of these

Answer:

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8. The absolute maximum value of the function

$f(x) = x^2 - 3x$ on [0,2] is

A. -2

B. 0

C. $-\frac{9}{4}$

D. None of these

Answer:

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9. The interval for which the function $f(x) = x^2 - 6x + 3$, is strictly increasing is :

A. $(1, \infty)$

B. (1,2)

C. $(3, \infty)$

D. None of these

Answer:

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10. The value of x for which function cos 2x attains its maximum is :

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

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

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

D. None of these

Answer:

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11. Fill in the blanks: br The rate of change of area of circle w.r.t. radius when radius is 5 cm is.....

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12. Fill in the blanks: The function $f(x) = x^2 - 3x + 2$ is increasing in .....

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13. Fill in the blanks: br The function $f(x) = e^2x$ is increasing on R.....

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14. Fill in the blanks: The slope of tangent to curve $y = x^3 - x$ at x= 2 is.....

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15. Fill in the blanks: The gradient of curve $y = x^3 + 3x + 2$ at x =3 is.....

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16. Statement True/ False: br The slope of the normal to the curve $y = 2x^2 + 3\sin x$ at x = 0 is -1/3

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17. Statement True/ False: br The product of slope of tangent and normal is -1

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18. Statement True/ False: br If $f(x) > 0$ then the function f(x) is said to be decreasing.

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19. Find a point on the parabola $f(x) = (x-3)^2$, where the tangent is parallel to the chord joining the points (3, 0) and (4, 1).

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20. Show that the function $f(x) = x^3 - 6x^2 + 12x + 8$ is an increasing on R.

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21. At what points on the curve $x^2 + y^2 - 2x - 4y + 1 = 0$ is the tangent parallel to y-axis ?

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22. Show that the tangents to the curve $y = 2x^3 - 4$ at the points x = 2 and x =-2 are parallel.

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23. Find the approximate value of f(2.01) where $f(x) = 4x^2 + 5x + 2.$

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24. The length 'x' of a rectangle is decreasing at the rate of 5 cm per minute and the width 'y' is increasing at the rate of 4 cm per minute, when x = 8 cm and y = 6 cm, find the rate of change of the perimeter of the rectangle.

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25. If side of a square is increasing at the rate of 1.5 cm/sec, then the rate of change of its perimeter is :

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26. The radius of a sphere is measured as 9 cm with an error of 0·03 cm, then find the approximate error in calculating its volume.

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27. The side of an equilateral triangle is increasing at the rate of 2 cm/s. At what rate is its area increasing when the side of the triangle is 20 cm/s. ?

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28. Find the least value of a so that the function $f(x) = x^2 + ax + 1$ is strictly increasing on (1, 2).

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29. Using differentials, find the approximate value of $\frac{82^1}{4}$ upto 3 places of decimal.

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30. The radius of a circle is increasing uniformly at the rate of 3 cm/s. Find the rate at which the area of the circle is increasing when the radius is 10 cm.

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31. The radius of a circle is increasing at the rate of 0.7 cm/s. What is the rate of increase of its circumference ?

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32. Find the rate of change of the area of a circle with respect to its radius r at r = 6 cm

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

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34. Show that the height of the cylinder of greatest volume which can be inscribed in a right circular cone of height h and semi-vertical angle α is one-third that of the cone

anD greatest volume of cylinder is $\frac{4}{27}\pi h^3 \tan^2 \alpha$

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35. Show that the right circular cone of least curved surface and given volume has an altitude equal to $\sqrt{2}$ times the radius of the base.

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36. Prove that volume of largest cone, which can be inscribed in a sphere, is $\left(\frac{8}{27}\right)^{th}$ part of volume of sphere.

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37. Find the local maxima and local minima, of the function $f(x) = \sin x - \cos x$, $0 \leq x \leq 2\pi$. Also find the local maximum and local minimum values.

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