RAVI MATHS TUITION CENTER, CHENNAI-82. WHATSAPP - 8056206308

Application Of Derivatives

12th Standard

Maths

45 x 1 = 45

1) Which of the following functions are decreasing on 0, $\frac{\pi}{2}$?

(a) cos x (b) cos 2x (c) cos 3x (d) tan x

2) On which of the following intervals is the function f given by f (x) = x^{100} + sin x^{-1} decreasing?

(a) (0, 1) (b) $\frac{\pi}{2}$, π (c) 0, $\frac{\pi}{2}$ (d) None of these

3) The interval in which y = x^2 e^{-x} is increasing is

(a) (– ∞, ∞) (b) (– 2, 0) (c) (2, ∞) (d) (0, 2)

4) For all real values of x, the minimum value of $\frac{1-x+x^2}{1+x+x^2}$ is

(a) 0 (b) 1 (c) 3 (d) $\frac{1}{3}$

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

(a) $\left(\frac{1}{3}\right)^{\frac{1}{3}}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

6) The absolute maximum value of y = x^3 – 3x + 2 in 0 ≤ x ≤ 2 is

(a) 4 (b) 6 (c) 2 (d) 0

7) The radius of air bubble is increasing at the rate of 0. 25 cm/s. At what rate the volume of the bubble is increasing when the radius is 1 cm.

(a) 4π cm^3/s (b) 22π cm^3/s (c) 2π cm^3/s (d) π cm^3/s

8) The total revenue in Rupees received from the sale of x units of a product is given by R(x) = $5x^2$ + 22x + 35. Find the marginal revenue, when x = 7, where by marginal revenue we mean the rate of change of total revenue with respect to the number of items sold at an instant.

(a) 7 (b) Rs 127 (c) Rs 92 (d) Rs 48

9) Find the approximate change in total surface area of a cube of side x metre caused by increase in side by 1%

(a) 12 m^2 (b) 0.12x^2 m^2 (c) 1.2x m^2 (d) 12x m^2

10) The volume of cube is increasing at the constant rate of 3cm^3/s. Find the rate of change of edge of the cube when its edge is 5 cm.

(a) 25 cm^3/sec (b) 25 cm/s (c) 1/25 cm/s (d) 1/25 cm^3/s

11) The total cost associated with the production of x units of a product is given by c(x) = $5x^2$ + 14x + 6. Find marginal cost when 5 units are produced

(a) Rs. 64 (b) Rs. 70 (c) Rs. 50 (d) Rs. (10x + 14)

12) A stone is dropped into a quiet lake and waves move in circles at a speed of 2cm per second. At the instant, when the radius of the circular wave is 12 cm, how fast is the enclosed area changing ?

(a) Decreasing at the rate of 48π cm^2 / sec (b) Increasing at the rate of 24π cm^2 / sec

(c) Increasing at the rate of 48π cm^2 / sec (d) Decreasing at the rate of 24π cm^2 / sec

13) Using approximation find the value of $y = \sqrt{4.01}$

(a) 2.025 (b) 2.001 (c) 2.01 (d) 2.0025

14) Find the approximate value of f(10.01) where f(x) = $5x^2$ + 6x + 3

(a) 564.06 (b) 564.01 (c) 563.00 (d) 563.01

15) Given a function y = f(x). Let Δx be the very small change in the value of x , then the corresponding change in the value of y that is Δy is approximately given by

(a) $\frac{f(x)}{f'(x)}\,\Delta x$ (b) f'(x).Δx (c) $\frac{dy}{dx}$.x (d) F'(x)

16) If the sides of an equilateral triangle are increasing at the rate of 4 cm/s, then the rate at which the area increases, when side is 5 cm, is

(a) $10\ \text{cm}^2/\text{s}$ (b) $\sqrt{3}\,\text{cm}^2/\text{s}$ (c) $10\sqrt{3}\,\text{cm}^2/\text{s}$ (d) $\frac{10}{3}\ \text{cm}^2/\text{s}$

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

(a) $\frac{1}{10}\text{rad/s}$ (b) $\frac{1}{20}\text{rad/s}$ (c) 20rad/s (d) 10 rad/s

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

(a) $54\pi\text{cm}^2/\text{min}$ (b) $7\pi\text{cm}^2/\text{min}$ (c) $27\ \text{cm}^2/\text{min}$ (d) None of the above

19) A kite is moving horizontally at a height of 151.5m. If the speed of kite is 10 m/ s, then the rate at which the string is being let out when the kite is 250 m away from the boy who is flying the kite and the height of the boy 1.5m is

(a) 4 m/s (b) 6 m/s (c) 7 m/s (d) 8 m/s

20) The total cost C(x) (in Rs) associated with the production of x units of an item is given by C(x) = $0.007x3 - 0.003x^2 + 15x + 4000$. The marginal cost when 17units are produced, is

(a) Rs. 20.967 (b) Rs. 21.96 (c) Rs. 81.968 (d) Rs. 11.967

21) The interval on which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing is

(a) $[-1, \infty)$ (b) $[-2, -1]$ (c) $(-\infty, -2]$ (d) [-1,1]

22) If $y = x(x-3)^2$ decreases for the values of x given by

(a) $1 < x < 3$ (b) $x < 0$ (c) $x > 0$ (d) $0 < x < \frac{3}{2}$

23) The function $f(x) = \tan x - x$

(a) always increases (b) always decreases (c) never increases

(d) sometimes increases and sometimes decreases

24) The function $f(x) = 4\sin^3 x - 6\sin^2 x + 12\sin x + 100$ is strictly

(a) increasing in $\left(\pi, \frac{3\pi}{2}\right)$ (b) decreasing in $\left(\frac{\pi}{2}, \pi\right)$ (c) decreasing in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ (d) decreasing in $\left[0, \frac{\pi}{2}\right]$

25) Which of the following functions is decreasing on $\left(0, \frac{\pi}{2}\right)$?

(a) sin2x (b) tanx (c) cosx (d) cos3x

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

(a) a vertical tangent (parallel to Y-axis) (b) a horizontal tangent (parallel to X-axis)

(c) an oblique tangent (d) no tangent

27) If x is real, then the minimum value of $x^2 - 8x + 17$ is

(a) -1 (b) 0 (c) 1 (d) 2

28) The function $f(x) = 2x^3 - 3x^2 - 12x + 4$ has

(a) two points of local maximum (b) two points of local minimum (c) one maxima and one minima

(d) no maxima or minima

29) The maximum slope of curve $y = -x^3 + 3x^2 + 9x - 27$ is

(a) 0 (b) 12 (c) 16 (d) 32

30) The functin f(x) = x^x has a stationary point at

(a) x =e (b) $x = \frac{1}{e}$ (c) x = 1 (d) $x = \sqrt{e}$

31) The distance covered by a particle in time t is given by $x = 3 + 8t - 4t^2$ After 1s, its velocity will be

(a) 0 units/s (b) 3 units/s (c) 4 units/s (d) 7 units/s

32) For $Ot < \theta < \frac{\pi}{2}$ the value of θ, if it increases twice as fast and its sine is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) None of these

33) If $f : R \to R$ be defined by $f(x) = 2x + \cos x$, then f

(a) has a minimum at $x = \pi$ (b) has at maximum at x = 0 (c) is a decreasing function

(d) is an i ucreasing function

34) Let $g(x) = 2f\left(\frac{x}{2}\right) + f(2 - x)$ and $f''(x) < 0$ for all $x \in (0, 2)$ then, $g(x)$ is

(a) increasing on (4/3,2) and increasing on (0,4/3)

(b) decreas ling on (0,4/3) and increasing on (4 / 3, 2)

(c) increasing on (0, 4 / 3) and decreasing on (4 / 3, 2) (d) None of the above

35) If the tange Jltat any point on the curve $x^4 + y^4 = c^4$ cut off inter cepts a and b on the coordinate axes, then the val ue of $a^{-4/3} + b^{-4/3}$ is

(a) $c^{-4/3}$ (b) $c^{-1/2}$ (c) $c^{1/2}$ (d) None of these

36) The area of a triangle is computed using the formula $S = \frac{1}{2}bc\sin A$.If the relative errors made in measuring b,e and calcuting S are respectively 0.02, 0.01 and 013 the approximate error in A when $A = \pi/6$.

(a) 0.05 radians (b) 0.01 radians (c) 0.05 degree (d) 0.01 degree

37) The area of greatest rectangle that can be inscribed in an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

(a) ab sq units (b) $\frac{ab}{2}$ sq units (c) 2ab sq units (d) 3ab sq units

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

(a) maximum (b) minimum (c) zero (d) neither maximum nor minimum

39) For the function y x^3 + 21, the value of x, when y increases 75 times as fast as X, is

(a) ± 3 (b) $\pm 5\sqrt{3}$ (c) ± 5 (d) none of these

40) Equation of tangent to the curve $y = 1 - e^{\frac{x}{2}}$ at the point of intersection with the y -axis is

(a) $x + 2y = 1$ (b) $2x + y = 0$ (c) $x - y = 2$ (d) none of these

41) Given function $f(x) = x^2e^{-x}$ then 'f' increases in the interval

(a) $(-\infty, \infty)$ (b) $(-2, 0)$ (c) $(2, \infty)$ (d) $(0, 2)$

42) Which of the following function is decreasing on $\left(0, \frac{\pi}{2}\right)$?

(a) cos x (b) -cos 2x (c) cos 3x (d) tan x

43) The maximum value of $\left(\frac{1}{x}\right)^x$ is

(a) e (b) e^e (c) $e^{\frac{1}{e}}$ (d) $\left(\frac{1}{e}\right)^{\frac{1}{e}}$

44) The height of the cylinder of greatest volume which can be inscribed in a right circular cone, of height 17, is

(a) $\frac{h}{2}$ (b) $\frac{h}{4}$ (c) $\frac{h}{3}$ (d) none of these

45) The function f(x) cos x - 2px is monotonically decreasing for

(a) $p < \frac{1}{2}$ (b) $p > \frac{1}{2}$ (c) $p < 2$ (d) $p > 2$