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Application of Derivatives

- Maximum slope of the curve $y = -x^3 + 3x^2 + 9x - 27$ is
(A) 0 (B) 12
(C) 16 (D) 32
- The function x^x is increasing, when
(A) $x > \frac{1}{e}$ (B) $x < \frac{1}{e}$
(C) $x < 0$ (D) for all real x
- What is the value of p for which the function $f(x) = p \sin x + \frac{\sin 3x}{3}$ has an extremum at $x = \frac{\pi}{3}$?
(A) 0 (B) 1
(C) -1 (D) 2
- What is the minimum value of $\cos\theta + \cos 2\theta$?
(A) -2 (B) $-\frac{9}{8}$
(C) 0 (D) $-\frac{9}{16}$
- If $x + y = 12$, what is the maximum value of xy ?
(A) 25 (B) 36
(C) 49 (D) 64
- How many tangents are parallel to x -axis for the curve? $y = x^2 - 4x + 3$
(A) 1
(B) 2
(C) 3
(D) No tangent is parallel to x -axis
- At which point the tangent to the curve $x^2 + y^2 = 25$ is parallel to the line $3x - 4y = 7$ is
(A) (3, -4) (B) (1, 2)
(C) (1, 3) (D) None of these
- The interval in which the function $f(x) = x^{\frac{1}{x}}$ is increasing is
(A) $(-\infty, e)$ (B) (1, e)
(C) (2, 3) (D) None of these
- The angle of intersection of the curves $y = x^2$ and $x = y^2$ at (1, 1) is
(A) $\tan^{-1}\left(\frac{4}{3}\right)$ (B) $\tan^{-1}(1)$
(C) 90° (D) $\tan^{-1}\left(\frac{3}{4}\right)$
- What is the maximum point of the curve $x = e^x y$?
(A) (1, e) (B) (1, e^{-1})
(C) (e , 1) (D) (e^{-1} , 1)
- The function $y = \tan^{-1} x - x$
(A) is always decreasing
(B) is always increasing
(C) first increases and then decreases
(D) first decreases and then increases
- The equation of tangent at $(-4, -4)$ on the curve $x^2 = -4y$ is
(A) $2x + y + 4 = 0$ (B) $2x - y - 12 = 0$
(C) $2x + y - 4 = 0$ (D) $2x - y + 4 = 0$
- The point at which the tangent to the curve $y = 2x^2 - x + 1$ is parallel to $y = 3x + 9$ will be
(A) (2, 1) (B) (1, 2)
(C) (3, 9) (D) (-2, 1)
- What is the least value of $f(x) = 2x^3 - 3x^2 - 12x + 1$ on $[-2, 2.5]$?
(A) -3 (B) 8
(C) -19 (D) -16.5
- What is the maximum value of the function $\log x - x$?
(A) -1 (B) 0
(C) 1 (D) ∞

16. What is the maximum value of $x.y$ subject to the condition $x + y = 8$?
 (A) 8 (B) 16
 (C) 24 (D) 32
17. If a and b are non-zero roots of $x^2 + ax + b = 0$, then the least value of $x^2 + ax + b$ is
 (A) $\frac{2}{3}$ (B) $-\frac{9}{4}$
 (C) $\frac{9}{4}$ (D) 1
18. If x is real, the minimum value of $x^2 - 8x + 17$ is
 (A) -1 (B) 0
 (C) 1 (D) 2
19. The rate of change of the surface area of a sphere of radius r , when the radius is increasing at the rate of 2 cm/s is proportional to
 (A) $\frac{1}{r}$ (B) $\frac{1}{r^2}$
 (C) r (D) r^2
20. If the distance 's' metres travelled by a particle in t seconds is given by $s = t^3 - 3t^2$, then the velocity of the particle when the acceleration is zero (is m/s) is
 (A) 3 (B) -2
 (C) -3 (D) 2