

Assignment(matrix theory)

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A Fill in the blanks

- 1) The larger of $\cos(\ln \theta)$ and $\ln(\cos \theta)$ if $e^{\frac{\pi}{2}} < \theta < \frac{\pi}{2}$ is (1983 – 1Mark)
- 2) The function $y = 2x^2 - \ln|x|$ is monotonically increasing for values of $x (\neq 0)$ satisfying the inequalities and monotonically decreasing for values of x satisfying the inequalities (1983 – 2Marks)
- 3) The set of all x for which $\ln(1+x) \leq x$ is equal to (1987 – 2Marks)
- 4) Let P be a variable point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with foci F_1 and F_2 . If A is the area of the triangle PF_1F_2 then the maximum value of A is (1994 – 2Marks)
- 5) Let C be the curve $y^3 - 3xy + 2 = 0$. If H is the set of points on the curve C where the tangent is horizontal and V is the set of the point on the curve C where the tangent is vertical then $H = \dots\dots\dots$ and $V = \dots\dots\dots$ (1994 – 2Marks)

B True / False

- 1) If $x-r$ is a factor of the polynomial $f(x) = a_n x^n + \dots + a_0$, repeated m times ($1 < m \leq n$), then r is a root of $f'(x) = 0$ repeated m times. (1983 – 1Mark)
- 2) For $0 < a < x$, the minimum value of the function $\log_a x + \log_x a$ is 2. (1984 – 1Mark)

C MCQs with One Correct Answer

- 1) If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has (1983 – 1Mark)
 - a. at least one root in $[0,1]$
 - b. one root in $[2,3]$ and other in $[-2,-1]$
 - c. imaginary roots
 - d. none of these
- 2) AB is a diameter of a circle and C is any point on the circumference of the circle. Then (1983 – 1Mark)
 - a. the area of ΔABC is maximum when it is isosceles
 - b. the area of ΔABC is minimum when it is isosceles
 - c. the perimeter of ΔABC is minimum when it is isosceles
 - d. none of these
- 3) The normal to the curve $x = a(\cos \theta + \theta \sin \theta)$, $y = a(\sin \theta - \theta \cos \theta)$ at any point ' θ ' is such that (1983 – 1Mark)
 - a. it makes constant angle with the x - axis
 - b. it passes through the origin
 - c. it is at a constant distance from the origin
 - d. none of these
- 4) If $y = a \ln x + bx^2 + x$ has its extremum values at $x = -1$ and $x = 2$, then (1983 – 1Mark)

a. $a = 2, b = -\frac{1}{2}$	c. $a = -2, b = \frac{1}{2}$
b. $a = 2, b = \frac{-1}{2}$	d. none of these
- 5) Which one of the following curves cut the parabola $y^2 = 4ax$ at right angles? (1994)

a. $x^2 + y^2 = a^2$	c. $y = ax$
b. $e^{\frac{x}{2a}}$	d. $x^2 = 4ay$
- 6) The function defined by $f(x) = (x+2)e^{-x}$ is (1994)
 - a. decreasing for all x

- b. decreasing in $(-\infty, -1)$ and increasing in $(-1, \infty)$
- c. increasing for all x
- d. decreasing in $(-1, \infty)$ and increasing in $(-\infty, -1)$

7) The function $f(x) = \frac{\ln(\pi + x)}{\ln(e + x)}$ is (1995S)

- a. increasing on $(0, \infty)$
- b. decreasing on $(0, \infty)$
- c. increasing on $\left(0, \frac{\pi}{e}\right)$, decreasing on $\left(\frac{\pi}{e}, \infty\right)$
- d. decreasing on $\left(0, \frac{\pi}{e}\right)$, increasing on $\left(\frac{\pi}{e}, \infty\right)$

8) On the interval $[0, 1]$ the function $x^{25}(1-x)^{25}$ takes its maximum value at the point (1995S)

- a. 0
- b. $\frac{1}{4}$
- c. $\frac{1}{2}$
- d. $\frac{1}{3}$