Class XII Mathematics

Pre-First Term Mixed Test 4

1. If $\begin{vmatrix} 3x & 3 \\ 13 & x \end{vmatrix} = \begin{vmatrix} 4 & -2 \\ 8 & 5 \end{vmatrix}$, then the value of x is

   a) 3 b) ± 5 c) 25 d) ± 1

2. The objective function of an LPP is

   a) A constant b) A linear function to be optimised

   c) An inequality d) A quadratic expression

3. If $\sec^{-1}\left(\frac{1+x}{1-y}\right) = a$, then $\frac{dy}{dx}$ is equal to

   a) $\frac{x-1}{y-1}$ b) $\frac{x-1}{y+1}$ c) $\frac{y-1}{x+1}$ d) $\frac{y+1}{x-1}$

4. If $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$, then A^2 equals

   a) $\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ b) $\begin{bmatrix} 2 & -2 \\ -2 & -2 \end{bmatrix}$ c) $\begin{bmatrix} -2 & -2 \\ -2 & 2 \end{bmatrix}$ d) $\begin{bmatrix} -2 & 2 \\ 2 & -2 \end{bmatrix}$

5. The value of $\begin{vmatrix} 43 & 44 & 45 \\ 44 & 45 & 46 \\ 45 & 46 & 47 \end{vmatrix}$ is

   a) 34 b) -32 c) -11 d) None of these

6. Two angles of a triangle are $\cot^{-1} 2$ and $\cot^{-1} 3$. The third angle of the triangle is

   a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{3\pi}{4}$ d) $\frac{5\pi}{6}$

7. If A is a square matrix such that $A^2 = A$, then the value of $(2 + A)^3 - 19A$ is

   a) 8 b) 9 c) -8 d) -9

8. Let W denote the set of words in the English dictionary. Define the relation R by R = {(x , y) ∈ W × W such that x and y have at least one letter in common}, then
   a) R is an equivalence relation
   b) R is reflexive and symmetric, but not transitive.
   c) R is reflexive and transitive, but not symmetric.
   d) R is only reflexive

9. For the function
$$f : R - \left\{\frac{-4}{3}\right\} \to R - \left\{\frac{3}{4}\right\}, defined\ as\ f(x) = \frac{4x}{3x+4}, f^{-1}(4) \text{ is}$$
   a) 2 b) 4 c) -4 d) -2

10. If $y = e^x + e^{-x}, then\ \frac{dy}{dx} =$
   a) $-e^x + e^{-x}$ b) $\sqrt{y^2 - 4}$ c) $\frac{1}{e^{2x}} + e^{-x}$ d) $\sqrt{y^2 + 4}$

11. The value of $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7}$ is
   a) $\tan^{-1}\frac{31}{17}$ b) $\tan^{-1}\frac{21}{15}$ c) $\tan^{-1}\frac{31}{15}$ d) NOT

12. For the points A(1,3), B(0,0), the value of k if D(k, 0) is a point such that the area of the ΔABD is 3 square units is
   a) 2 b) 4 c) ± 2 d) ± 4

ANSWER TO Q 13 TO 15 BASED ON THE FOLLOWING INFORMATION

A company produces two types of goods, A and B, that require gold and silver. Each unit of type A requires 3g of silver and 1g of gold, while that of type B requires 1g of silver and 2g of gold. The company can use at the most 9g of silver and 8 g of gold. Each unit of type A brings a profit of ₹120 and that of type B ₹150.

13. If number of units of A is assumed to be x and the number of units of B to be y, the restraints within which profit is maximised is

a) $x+3y\le 9, x+2y\le 8, x, y\ge 0$ b) $3x+y\le 9, 2x+y\le 8, x, y\ge 0$

c) $3x+y\le 9, x+2y\le 8, x, y\ge 0$ d) None of these

14. The objective function and maximum profit in the given problem is

a) $Z=12x+15y$, ₹590 b) $Z=120x+150y$, ₹690

c) $Z=15x+12y$, ₹690 d) $Z=150x+120y$, ₹590

15. In solving the above LPP, the corner points achieved are

a) (0,0), (0,4),(2,3),(3,0) b) (0,0), (0,3),(3,2),(3,0)

c) (0,0), (0,4),(2,5),(4,0) d) None of these

16. If $x=e^t \sin t, y=e^t \cos t$, then the value of $\frac{dy}{dx}$ at $t=\frac{\pi}{4}$ is

a) 1 b) 2 c) 3 d) None of these

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

a) 46 b) 56 c) 66 d) 76

18. The intervals in which the function given by $f(x) = \sin 3x, x \in \left[0, \frac{\pi}{2}\right]$ is increasing is

a) $\left(0, \frac{\pi}{6}\right)$ b) $\left(\frac{\pi}{6}, \frac{\pi}{2}\right)$ c) $\left(0, \frac{\pi}{6}\right]$ d) $\left(\frac{\pi}{6}, \frac{\pi}{2}\right]$

19. The point at which the tangent to the curve $y=\sqrt{4x+3}-1$ has its slope $\frac{2}{3}$ is

a) (2,3) b) (3,2) c) (3,4) d) (4,3)

20. The equations of the normal to the curve $x^{\frac{1}{3}}+y^{\frac{1}{3}}=2$ at (1,1) is

a) $x+y=0$ b) $2x+3y=4$ c) $y+x=2$ d) $y-x=0$

CASE STUDY

A small firm manufacturers gold rings and chains. The total number of rings and chains manufactured per day is at most 24. it takes 1 hour to make ring and 30 minutes to make a chain. The maximum number of hours available per day is 16. The profit on a ring is Rs.300 and that on a chain is Rs.190. Firm is concerned about earning maximum profit on the number of rings(x) and chains(y) that have to be manufactured per day .

Using the above information give the answer of the following questions.

21. The objective function is
    a) $190x+300y$ b) $300x+190y$
    c) $x+y$ d) None of these
22. For maximum profit the number of rings and chains firm has to make is
    a) 0,24 b) 8,16 c) 16,8 d) 16,0
23. Corner points of feasible region are
    a) (0,24) b) (8,16) c) a &b both d) (12,0)
24. Maximum profit earned by the firm is equal to
    a) 6440 b) 4560 c) 5000 d) 5440
25. Constraints of the above LPP are
    a) $x\leq 0$ b) $2x+y\leq 32$ c) $y\geq 1$ d) NOT