

HOLIDAY HOME WORK

CLASS XII MATHEMATICS(2025-26)

- Given $A = \{a, b, c\}$ and R is $\{(a, a), (a, b), (a, c), (b, b), (c, c)\}$, then R is ____ .
(a) Symmetric but neither reflexive nor transitive
(b) Symmetric and transitive but not reflexive
(c) Reflexive but neither symmetric nor transitive
(d) An equivalence relation
- Let $R = \{(3, 3), (5, 5), (9, 9), (12, 12), (5, 12), (3, 9), (3, 12), (3, 5)\}$ be a relation on the set $A = \{3, 5, 9, 12\}$. Then, R is:
(a) Reflexive, symmetric but not transitive. (b) Symmetric, transitive but not reflexive.
(c) An equivalence relation. (d) Reflexive, transitive but not symmetric.
- Let R be a relation on B defined by $R = \{(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)\}$. Then R is
(a) Reflexive (b) Symmetric (c) Transitive (d) Equivalence
- Let $A = \{1, 2, 3\}$ and $B = \{2, 4, 6, 8\}$. Consider the rule $f: A \rightarrow B, f(x) = 2x, \forall x \in A$. The domain, co-domain and range of f respectively are
(a) $\{1, 2, 3\}, \{2, 4, 6\}, \{2, 4, 6, 8\}$ (b) $\{1, 2, 3\}, \{2, 4, 6, 8\}, \{2, 4, 6\}$
(c) $\{2, 4, 6, 8\}, \{2, 4, 6, 7\}, \{1, 2, 3\}$ (d) $\{2, 4, 6\}, \{2, 4, 6, 8\}, \{1, 2, 3\}$
- The relation $R = \{(1,1), (2,2), (3,3)\}$ on the set $\{1,2,3\}$ is :
(a) Symmetric only (b) Reflexive only
(c) An equivalence relation (d) Transitive only
- $\sin(\sec^{-1} x + \operatorname{cosec}^{-1} x) =$
(a) 1 (b) -1 (c) $\pi/2$ (d) $\pi/3$
- The principle value of $\sin^{-1}(\sqrt{3}/2)$ is
(a) $2\pi/3$ (b) $\pi/6$ (c) $\pi/4$ (d) $\pi/3$
- Simplified form of $\cos^{-1}(4x^3 - 3x)$
(a) $3 \sin^{-1}x$ (b) $3 \cos^{-1}x$ (c) $\pi - 3 \sin^{-1}x$ (d) None of these
- The principle value of $\sin^{-1}(\sin 2\pi/3)$ is
(a) $2\pi/3$ (b) $\pi/3$ (c) $-\pi/6$ (d) $\pi/6$
- The value of $\cos^{-1}(1/2) + 2\sin^{-1}(1/2)$ is equal to
(a) $\pi/4$ (b) $\pi/6$ (c) $2\pi/3$ (d) $5\pi/6$
- If A is a matrix of order 3×4 and B is a matrix of order 4×3 , find the order of the matrix (AB)
(a) 3×3 (b) 3×4 (c) 4×3 (d) 4×4
- If a matrix has 8 elements, then which of the following will not be a possible order of the matrix?

- (d) 4×4

13. If A and B are square matrices of the same order, then $(A + B)(A - B)$ is equal to

- (d) $A^2 - BA + B^2 + AB$

14. If $A = [a_{ij}]_{2 \times 2}$, where $a_{ij} = \begin{cases} 1 & \text{if } i \neq j \\ 0 & \text{if } i = j \end{cases}$ then A^2 is equal to

- (d) None of these

15. If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and $A = A^T$, then

- (d) None of these

SECTION-B

16. Prove that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a - b| \text{ is even}\}$, is an equivalence relation.

17. Show that the relation S in the set $A = \{x \in \mathbb{Z} : 0 \leq x \leq 12\}$ given by

$S = \{(a, b) : a, b \in \mathbb{Z}, |a - b| \text{ is divisible by } 4\}$ is an equivalence relation. Find the set of all elements related to 1.

18. Prove that the relation R in the set $A = \{5, 6, 7, 8, 9\}$ given by $R = \{(a, b) : |a - b| \text{ is divisible by } 2\}$, is an equivalence relation. Find all elements related to the element 6

19. If $A = \{1, 2, 3, \dots, 9\}$ and R be $A \times A$ defined by $(a, b)R(c, d)$. If $a + d = b + c$ for $(a, b), (c, d)$ in $A \times A$. Prove that R is an equivalence relation. Also, Obtain the equivalence classes $[(2, 5)]$

20. Find the value of the following

21. If $A = \{1, 2, 3, \dots, 9\}$ and R be $A \times A$ defined by $(a, b)R(c, d)$. If $a + d = b + c$ for $(a, b), (c, d)$ in $A \times A$. Prove that R is an equivalence relation. Also, Obtain the equivalence classes $[(2, 5)]$

22. Find the value of the following

- (iii) $\tan^{-1}\left\{2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right\}$ (iv) $\cot^{-1}\left\{\sin^{-1}\left(\cos\left(\tan^{-1}1\right)\right)\right\}$

23. Find the domain of the following

- (vi) $\sin^{-1} x + \sin x$

24. Construct a 2×2 matrix $A = [a_{ij}]$, whose elements are given

(i) $a_{ij} = \frac{(i+j)^2}{2}$

(ii) $a_{ij} = \frac{|2i-3j|}{2}$

(iii) $a_{ij} = e^{-ix} \cos\left(\frac{\pi}{2}i + jx\right)$

25. Find the value of a,b,c and d from the following equations; $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$

26. Simplify : $\tan \theta \begin{bmatrix} \sec \theta & \tan \theta \\ \tan \theta & -\sec \theta \end{bmatrix} + \sec \theta \begin{bmatrix} -\tan \theta & -\sec \theta \\ \sec \theta & \tan \theta \end{bmatrix}$

27. Express the following matrix as the sum of a symmetric and a skew symmetric matrix. $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$

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29. If $P(x) = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$, then $P(x)P(y) = P(x+y) = P(y)P(x)$

SECTION-C CASE STUDY

30. Read the text carefully and answer the questions:

The nut and bolt manufacturing business has gained popularity due to the rapid Industrialization and Introduction of the Capital-Intensive Techniques in the Industries that are used as the Industrial fasteners to connect various machines and structures. Mr. Suresh is in manufacturing business of Nuts and bolts. He Produces three types of bolts, x, y, and z which he sells in two markets.

Annual sales (in Rs) indicated below:



Markets	Products		
I	10000	2000	18000
II	6000	20000	8000

- If unit sales prices of x, y and z are Rs2.50, Rs1.50 and Rs1.00 respectively, then find the total revenue Collected from Market-I & II.
- If the unit costs of the above three commodities are Rs2.00, Rs1.00 and 50 paise respectively, then find the cost price in Market I and Market II.
- If the unit costs of the above three commodities are Rs2.00, Rs1.00 and 50 paise respectively, then find gross profit from both the markets.

