

HOLIDAY HOMEWORK- 2022-23

SUBJECT – MATHEMATICS (041)

CLASS - XII

CHAPTER – RELATIONS AND FUNCTIONS, MATRICES & DETERMINANTS

NOTE: Do the worksheet in your school register. Work should be done neatly.

- Q1. Set A has 3 elements and set B has 4 elements. Find the number of injective mappings that can be defined from A to B.
- Q2. Check whether a relation $R = \{(a, b) : a < b^3, a, b \in \mathbb{N}\}$ is transitive or not. Justify.
- Q3. Is the function $f: \mathbb{N} \rightarrow \mathbb{N}$ given by $f(1) = f(2) = 1$ and $f(x) = x - 1$, for every $x > 2$ one one? Justify.
- Q4. If $f(x) = |x|$ and $g(x) = [x-1]$ where $[]$ denotes greatest integer function, find $f \circ g(-2.5)$
- Q5. $R = \{(a, b) : a + b = 6, a, b \in \{1, 2, 3, 4\}\}$. Write range of R.
- Q6. Write the domain of $f(x) = \frac{1}{x^2 - 4}$
- Q7. Write the range of $f(x) = \frac{x-1}{|x-1|}$.
- Q8. Let R be relation defined on R as $R = \{(a, b) : |a-b| \text{ is divisible by } 5\}$. Show that R is an equivalence relation.
- Q9. Let $A = \mathbb{R} - \{3\}$ and $B = \mathbb{R} - \{1\}$. Let $f: A \rightarrow B$ be defined as $f(x) = \frac{x-2}{x-3}$
Find $g: B \rightarrow A$ such that $f \circ g = \text{gof} = I$
- Q10. Let R be relation defined on $A \times A$, where $A = \{1, 2, 3, \dots, 9\}$ as $R = \{(a, b)R(c, d) \text{ iff } ad(b+c) = bc(a+d)\}$. Show that R is an equivalence relation.
- Q11. Find the number of all the possible one-one functions from set $A = \{3, 5, 7\}$ to itself.
- Q12. Let f be the greatest integer function and g be the absolute value function, find the value of

$$(g \circ f)\left(\frac{5}{3}\right) - (f \circ g)\left(\frac{-5}{3}\right).$$

- Q13. If $f(x) = 2x - 3$, write $f^{-1}(3)$
- Q14. Consider $f: \mathbb{R}_+ \rightarrow (-9, \infty)$ given by $f(x) = 5x^2 + 6x - 9$. Prove that f is invertible with

$$f^{-1}(y) = \frac{\sqrt{54+5y} - 3}{5}.$$

- Q15. Show that the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \frac{x}{x^2 + 1}, \forall x \in \mathbb{R}$, is neither one-one nor onto.

- Q16. If $A = \begin{bmatrix} -1 & 2 & -5 \end{bmatrix}$ and $B^T = \begin{bmatrix} 2 & -1 & 7 \end{bmatrix}$, find AB.

- Q17. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$ then find the values of a and b.

- Q18. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$, $2A - B = \begin{bmatrix} -1 & 5 & 3 \\ 5 & 6 & 0 \end{bmatrix}$, find B.

- Q19. If $\begin{bmatrix} 2x & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 3 \end{bmatrix} = 0$, find x.

- Q20. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, prove that $(A - 2I)(A - 3I) = 0$

- Q21. If $\begin{bmatrix} 0 & -5 & a \\ b & c & 3 \\ 2 & d & 0 \end{bmatrix}$ is skew symmetric, find a, b, c and d.

