

CLASS XI - MATHEMATICS

1. The relation f is defined by $f(x) = \begin{cases} x^2, & 0 \leq x \leq 3 \\ 3x, & 3 \leq x \leq 10 \end{cases}$

The relation g is defined by $g(x) = \begin{cases} x^2, & 0 \leq x \leq 2 \\ 3x, & 2 \leq x \leq 10 \end{cases}$

Show that f is a function and g is not a function.

2. If $f(x) = x^2$, find $\frac{f(1.1) - f(1)}{(1.1) - 1}$.

3. Find the domain of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$.

4. Find the domain and the range of the real function f defined by $f(x) = \sqrt{x-1}$.

5. Find the domain and the range of the real function f defined by $f(x) = |x-1|$.

6. Let $f = \left\{ \left(x, \frac{x^2}{1+x^2} \right) : x \in \mathbf{R} \right\}$ be a function from \mathbf{R} into \mathbf{R} . Determine the range of f .

7. Let $f, g : \mathbf{R} \rightarrow \mathbf{R}$ be defined, respectively by $f(x) = x + 1$, $g(x) = 2x - 3$. Find

$$f + g, f - g \text{ and } \frac{f}{g}.$$

8. Let $f = \{(1,1), (2,3), (0,-1), (-1,-3)\}$ be a function from \mathbf{Z} to \mathbf{Z} defined by $f(x) = ax + b$, for some integers a, b . Determine a, b .

9. Let R be a relation from \mathbf{N} to \mathbf{N} defined by $R = \{(a, b) : a, b \in \mathbf{N} \text{ and } a = b^2\}$. Are the following true?

- (i) $(a,a) \in R$, for all $a \in \mathbf{N}$ (ii) $(a,b) \in R$, implies $(b,a) \in R$
(iii) $(a,b) \in R, (b,c) \in R$ implies $(a,c) \in R$.

Justify your answer in each case.

10. Let $A = \{1,2,3,4\}, B = \{1,5,9,11,15,16\}$ and $f = \{(1,5), (2,9), (3,1), (4,5), (2,11)\}$. Are the following true?

- (i) f is a relation from A to B (ii) f is a function from A to B .

Justify your answer in each case.