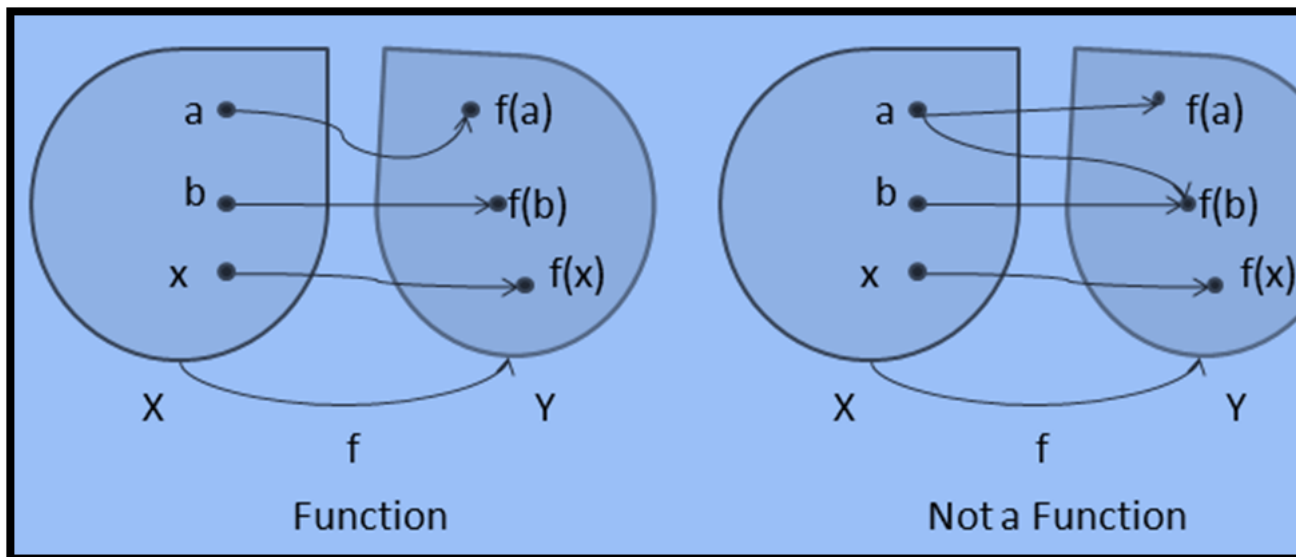


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NCERT Class 11 Mathematics Solutions: Chapter 2 – Relations and Functions Miscellaneous Exercise Part 1

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

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

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

Answer:

The relation f is defined as

$$f(x) = \begin{cases} x^2, 0 \leq x \leq 3 \\ 3x, 3 < x \leq 10 \end{cases}$$

It is observed that for

$$0 \leq x < 3, f(x) = x^2$$

$$3 < x \leq 10, f(x) = 3x$$

Also, at $x = 3, f(x) = 3^2 = 9$ or $f(x) = 3 \times 3 = 9$

i.e., at $x = 3, f(x) = 9$

Therefore, for $0 \leq x \leq 10$, the images of $f(x)$ are unique.

Thus, the given relation is a function.

The relation g is defined as

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

It can be observed that for $x = 2$, $g(x) = 2^2 = 4$ and also $g(x) = 3 \times 2 = 6$

Hence, element of the domain of the relation corresponds to two different images i.e., 4 and 6.

Hence, this relation is not a function.

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

Answer:

$$f(x) = x^2$$

$$\therefore \frac{f(1.1) - f(1)}{1.1 - 1} = \frac{(1.1)^2 - (1)^2}{(1.1 - 1)}$$

$$= \frac{1.21 - 1}{0.1}$$

$$= \frac{0.21}{0.1}$$

$$= 2.1$$

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

Answer:

The function is,

$$f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$$

$$= \frac{x^2 + 2x + 1}{(x - 6)(x - 2)}$$

It can be seen that function is defined for all real numbers except at $x = 6$ and $x = 2$.

So, the domain of is $R - \{2, 6\}$.