



Functions Ex 2.1 Q5(i)

$f : N \rightarrow N$ given by $f(x) = x^2$

let $x_1 = x_2$ for $x_1, x_2 \in N$
 $\Rightarrow x_1^2 = x_2^2 \Rightarrow f(x_1) = f(x_2)$
 $\therefore f$ is one-one.

Surjectivity: Since f takes only square value like 1,4,9,16,.....
so, non-perfect square values in N (co-domain) do not have pre image in domain N .
Thus, f is not onto.

Functions Ex 2.1 Q5(ii)

$f : Z \rightarrow Z$ given by $f(x) = x^2$

Injectivity: let x_1 & $-x_1 \in Z$
 $\Rightarrow x_1 \neq -x_1$
 $\Rightarrow x_1^2 = (-x_1)^2 \Rightarrow f(x_1) = f(-x_1)$
 $\Rightarrow f$ is not one-one.

Surjective: Again, f takes only square values 1,4,9,16,....
So, no non-perfect square values in Z have a pre image in domain Z .
 $\therefore f$ is not onto.

Functions Ex 2.1 Q5(iii)

$f : N \rightarrow N$, given by $f(x) = x^3$

Injectivity: let $y, x \in N$ such that
 $x = y$
 $\Rightarrow x^3 = y^3$
 $\Rightarrow f(x) = f(y)$
 $\therefore f$ is one-one

Surjective:

$\because f$ attain only cubic number like 1,8,27,64,...

So, no non-cubic values of N (co-domain) have pre image in N (Domain)
 $\therefore f$ is not onto.

Functions Ex 2.1 Q5(iv)

$f : Z \rightarrow Z$ given by $f(x) = x^3$

Injectivity: let $x, y \in Z$ such that
 $x = y$
 $\Rightarrow x^3 = y^3$
 $\Rightarrow f(x) = f(y)$
 $\Rightarrow f(x) = f(y)$
 $\Rightarrow f$ is one-one.

Surjective: Since f attains only cubic values like $\pm 1, \pm 8, \pm 27, \dots$
so, no non-cubic values of Z (co-domain) have pre image in Z (domain)
 $\therefore f$ is not onto.

Functions Ex 2.1 Q5(v)

$f: \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = |x|$

Injectivity: let $x, y \in \mathbb{R}$ such that

$$x = y \text{ but if } y = -x$$

$$\Rightarrow |x| = |y| \Rightarrow |y| = |-x| = x$$

$\therefore f$ is not one-one.

Surjective: Since f attains only positive values, for negative real numbers in \mathbb{R} , there is no pre-image in domain \mathbb{R} .

$\therefore f$ is not onto.

***** END *****