(11) $f(x) = x^2$ — (1) $(x \in N)$

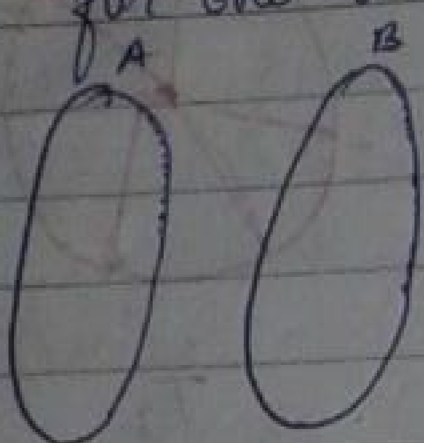
DATE: 01/05/19

Exercise - 1.2

(1) $R_* \to R_*$ $f(x) = \frac{1}{x}$ — (1)

To prove:- one-one and onto function.

$\Rightarrow$ for one-one function



$\Rightarrow f(y) = \frac{1}{y}$ — (11)

$f(x) = f(y)$

$\frac{1}{x} = \frac{1}{y}$

$x = y$ yes it is one-one function.

$\Rightarrow$ for onto function

$\Rightarrow f(x) = \frac{1}{x}$ — (1)

$y = \frac{1}{x}$

$x = \frac{1}{y}$

Now, putting the value of x in eqn (1)

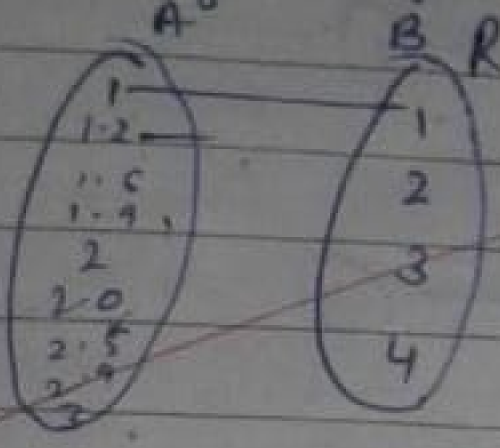
$f\left(\frac{1}{y}\right) = \frac{1}{\frac{1}{y}} \Rightarrow y$

Now, y is the answer,
Hence, it is onto function

Ex - 1.2

(ii) part of the Ques.

$R \longrightarrow N$.

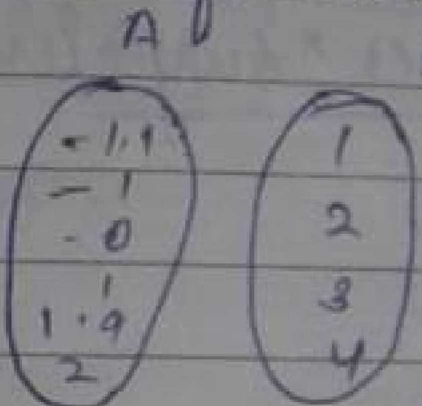


for ~~onto~~ ~~for~~ one & one function.

yes, it is one-one function or injective.

every Domain has unique Range

for onto function



Here, It is not onto function because to follow this It has to follow its condition which is not done.

Here, all the nos. can't be paired in co-domain. Some negative numbers exist in set A will not be paired. Hence, Co-Domain $\neq$ Range.

(2) (i) $f: N \to N$ given by $f(x) = x^2$.

$\Rightarrow$ for injective function

$$f(x) = x^2 \longleftarrow (i)$$
$$f(y) = y^2 \longleftarrow (ii)$$

Now, one equating (i) & (ii) eqns. we get

$$x^2 = y^2$$
$$x = \sqrt{y^2}$$
$$x = y$$

Hence, It is ~~not injective~~ Injective ~~and surjective~~.

for surjective function :-

$$f(x) = x^2 \quad \text{— (i)}$$

$$y = x^2$$

$$x = \sqrt{y} \quad \text{— (ii)}$$

$$f(\sqrt{y}) = (\sqrt{y})^2$$

$$= \pm y$$ It is not surjective.

(ii) $\underset{A}{f} : Z \to \underset{B}{Z}$ if $f(x) = x^2$.

integers

for injective $\Rightarrow$

$$f(x) = x^2 \quad \text{— (i)}$$

$$f(y) = y^2 \quad \text{— (ii)}$$

On equating both the eqns.

$$f(x) \neq f(y)$$

$$x^2 = y^2$$

$$x = \sqrt{y^2}$$

$$\boxed{x = y}$$ Hence, It is Injective

for surjective

$$f(x) = x^2 \quad \text{— (i)}$$

$$y = x^2$$

$$\& \; x = \sqrt{y} \quad \text{— (ii)}$$

On Putting the value of x in eqn (i)

$$f(\sqrt{y}) = (\sqrt{y})^2$$
$$= \pm y \quad \text{(not surjective)}$$

(iii) $f: R \to R$ given by $f(x) = x^2$

(i) for Injective :- $f(x) = x^2$ — (1)

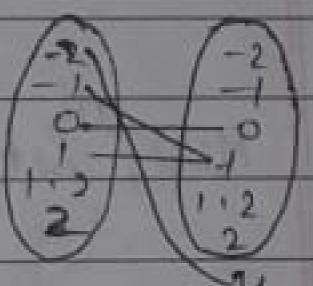
$\Rightarrow f(y) = y^2$ — (11)

Now, On equating both eqn.

$$f(x) = f(y)$$
$$\Rightarrow x^2 = y^2$$
$$x = \sqrt{y^2}$$
$$\therefore x = \pm y \quad \text{It is not injective function}$$

(ii) for Surjective :- $f(x) = x^2$ — (1)

$$y = x^2$$
$$x = \sqrt{y} \text{ — (11)}$$



On putting the value of x in eqn (1), we get

$$f(x) = x^2$$
$$f(\sqrt{y}) = (\sqrt{y})^2$$
$$x = y \quad \text{It is not Surjective.}$$

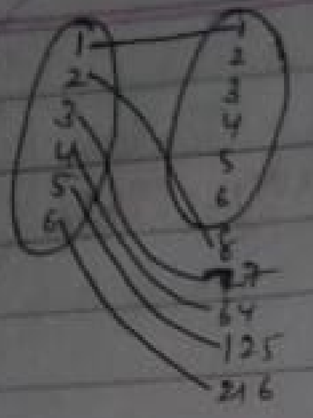
Here, all negative nos. cannot be paired.

(iv) $f: N \to N$ $f(x) = x^3$.

$\therefore$ for Injective = $f(x) = x^3$ — (1)

$f(y) = y^3$ — (11)

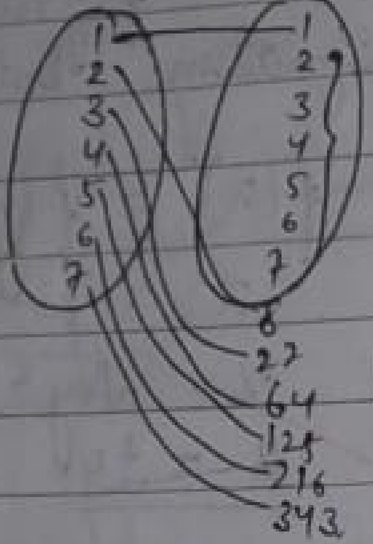
Now, On equating both eqn.



$f(x) = f(y)$
$x^3 = y^3$
$x = \sqrt[3]{y^3}$
$\underline{x = y}$ It is Injective

Here, all the domain set is paired to co-domain because here no matter all codomain sets should be paired. hence codomain $\neq$ Range.

$\therefore$ for surjective :-



$\cancel{f(x) = f(y)}$
$f(x) = x^3$
$y = x^3$
$x = \sqrt[3]{y}$

Here $f(x) = x^3$
$f(\sqrt[3]{y}) = (y\sqrt{y})^3$

Here $\underline{x \neq y}$.

Here, all set of codomain is not paired.
It is not surjective.

(v) $f: Z \to Z$ $f(x) = x^3$
$\therefore$ for Injective :- $f(x) = x^3$ — (i)
$f(y) = y^3$ — (ii)
On equating both the eqns, we get
$f(x) = f(y)$
$x^3 = y^3$
$x = \sqrt[3]{y^3}$
$\underline{x = y}$ It is Injective