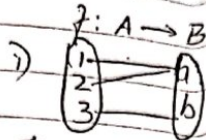


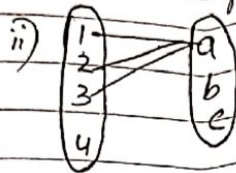
## Calculus:

Function (f): is a rule which associates every element of set A to a unique element of set B.

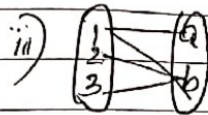
Ex



$\therefore$  It is a function.



$\therefore$  It is not a function because 4 does not have an image.



$\therefore$  It is not a function as 1 does not have a unique image.

iv)  $f(x) = 2x + 3$  is a function on Natural nos.

v)  $x = f(p)$  is a demand function, where  $x \rightarrow$  quantity  
 $p \rightarrow$  price

Limit of a function:

$f(x)$  is said to have a limit as  $x \rightarrow a$  if  $\lim_{x \rightarrow a^+} f(x) = f(a) = \lim_{x \rightarrow a^-} f(x)$

Properties of limits

$$\bullet \lim_{x \rightarrow a} (f(x) \pm g(x)) = \lim_{x \rightarrow a} f(x) \pm \lim_{x \rightarrow a} g(x)$$

$$\bullet \lim_{x \rightarrow a} (f(x) \cdot g(x)) = \lim_{x \rightarrow a} f(x) \cdot \lim_{x \rightarrow a} g(x)$$

$$\bullet \lim_{x \rightarrow a} \left[ \frac{f(x)}{g(x)} \right] = \frac{\lim_{x \rightarrow a} f(x)}{\lim_{x \rightarrow a} g(x)}$$