2. Functions.

(→) **Means step continued on new line.**

For example:

ii) $i\frac{(4+3i)}{(1-i)} = \frac{4i+3i^2}{1-i} \times \frac{1+i}{1+i}$

ii) $i\frac{(4+3i)}{(1-i)} =$

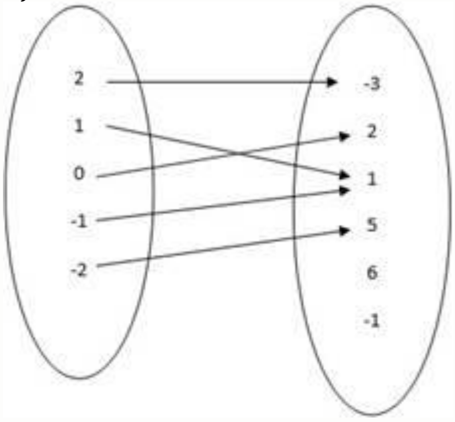
→ $\frac{4i+3i^2}{1-i} \times \frac{1+i}{1+i}$

---x---

Exercise no 2.1

1) Check if the following relations are function:

a)



Solution:

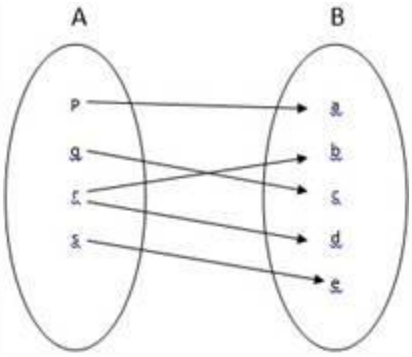
Yes, the given relation in ordered pair form is as follows:

{(2,-3),(1,1),(0,2),(-1,1),(-2,5)}-

Here, we observe that the first components of ordered pairs in the above relation are
distinct.

Hence , it represents a function.

b)



Solution:

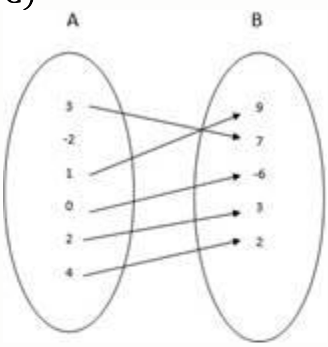
No, the given relation in ordered pairs in form is as follows:

{(p,a),(q,c),(r,b),(r,d),(s,e)}

Here we observe that the first components of ordered pairs are not distinct in the above relation.

Hence, it does not represent a function.

C)



Solution:

No, from arrow diagram we observe that there is an elements ie - 2 € A such that it does not have any image in B

2. Which sets of ordered pairs represent function from A = {1, 2, 3, 4,} to B = {-

1, 0, 1, 2, 3}? Justify

a) {(1, 0),(3,3),(2,-1),(4,1),(2,2)}

Solution:

No, This relation is not a function. Since the first element of ordered pairs (2,-1) and (2,2) i.e. 2 is related to two elements -1 and 2

b) {(1,2),(2,-1),(3,1),(4,3)}

Solution:

Yes, domain of given relation is set A = {1, 2, 3, 4} and co –domain set B ={-1, 0, 1, 2, 3}

Here we observe that each element of domain set A is related to one and only one element in co-domain set B.

Hence, given relation is function.

c) {(1, 3), (4, 1), (2, 2)}

Solution:
No, here we observe that 3 € A is not related to any elements in B.

Hence, give relation is not a function.

d) {(1, 1), (2, 1), (3, 1), (4, 1)}

Solution:

Yes, here we observe that each elements of domain set A is related to one and only one element in co-domain set B.

Hence, Given relation is function.

3. If $f(m) = m^2 - 3m + 1$, Find

(a) f(0) (b) f(-3)

(c) $f\left(\frac{1}{2}\right)$ (d) $f(x+1)$ (e) $f(-x)$

Solution:

Let $f(m) = m^2 - 3m + 1$

(a) $f(0)$

$= o^2 - 3(0) + 1 = 1$

$(b) f(-3) =$

$\rightarrow (-3)^2 - 3(-3) + 1$

$= 9 + 9 + 1 = 19$

$(c) f\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)2 - 3\left(\frac{1}{2}\right) + 1$

$= \frac{1}{4} - \frac{3}{2} - + 1$

$= \frac{5}{2} - \frac{3}{2} = -\frac{1}{4}$

$(d) f(x + 1) = (x + 1)^2$

$\rightarrow - 3(x + 1) + 1$

$= x^2 + 2x + 1 -$

$\rightarrow 3x - 3 + 1$

$= x^2 - x - 1$

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

$\rightarrow 3(-x) + 1$

$= x^2 + 3x + 1$

4. Find x, if $g(x) = 0$, where

(a) $g(x) = \frac{5x - 6}{7}$

(b) $g(x) = \frac{18 - 2x^2}{7}$

(c) $g(x) = 6x^2 + x - 2$

Solution:

Since g(x) = 0

(a) $g(x) = \frac{5x-6}{7}$

$= \frac{5x-6}{7} = 0$

= 5x-6 = 0

$= x = \frac{6}{5}$

(b) $g(x) = \frac{18-2x^2}{7}$

$= \frac{18-2x^2}{7} = 0$

$= 18 - 2x^2 = 0$

$= 9 - \mathbf{x^2} = 0$

$= x = \pm 3$

(c) $g(x) = 6x^2 + x - 2$

$= 6x^2 - 3x + 4x - 2 = 0$

$= 6x^2 - 3x + 4x - 2 = 0$

= 3x(2x-1) + 2(2x-1) = 0

= (2x-1) (3x-2) = 0

= 2x-1=0 or 3x+2=0

$= \frac{1}{2}$ or $x = -\frac{2}{3}$

5. Find x, if f(x) = g(x),

where $f(x) = x^4 + 2x^2$,

$\mathbf{g(x) = 11x^2}$

Solution:

$f(x) = x^4 + 2x^2$,

$g(x) = 11x^2$

Since $f(x) = g(x)$
$= x^4 + 2x^2 = 11x^2$

$= x^4 - 9x^2 = 0$

$= x^2(x^2 - 9) = 0$

$= x^2 = 0$ or $x^2 - 9 = 0$

$= x = 0, x = \pm 3$

6. If $\mathbf{f(x) = \{x^2 + 3,}$

$\mathbf{x \leq 2}$

$\mathbf{5x + 7, x \geq 2}$, then find

a) f(3) b) f(2)

c) f(0)

Solution:

Given: $f(x) = \{x^2 + 3,$

$x \leq 2$

$5x + 7, x \geq 2$

$f(3) = 5(3) + 7$

$= 15 + 7 = 22$

b) $f(2) = 2^2 + 3$

$\rightarrow = 4 + 3 = 7$

c) $f(0) = 0^2 + 3 = 3$

7. If f(x) = {4x – 2, x ≤ - 3

5, - 3 < x > 3 , then find

x^2,x ≥ 3

a) f(-4)

b) f(-3)

c) f(1)

d) f(5)

Solution:

Given: f(x) = {4x – 2,

x ≤ - 3

5, - 3 < x > 3 , then find

x^2,x ≥ 3

a) f(-4) = 4(-4)– 2 = - 18

b) f(-3) = 4(-3)- 2 = -14

c) f(1) = 5

d) $f(5) = 5^2 = 25$

8. If f(x) = 3x+5,

g(x) = 6x – 1 ,

then find

a) (f+g)(x)

b) (f-g)(2)

c) (fg)(3)

d) (f/g)(x) and its domain.

Solution:

Given: f(x)= 3x+5, g(x) = 6x – 1,

a) (f+g) (x) = f(x) + g(x)

= (3x+5) + (6x-1)

= 9x + 4

b) (f-g)(2) = f(2) – g(2)

= [3(2) + 5] – [6(2)-1]

= [6+5] – [12-1]

= 11-11 = 0

c) (fg)(3) = f(3) x g(3)

= [3(3)+5] x [6(3)-1]

= 14 x 17

= 238

d) $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$

$\left(\frac{f}{g}\right)(x) = \frac{3x+5}{6x-1}$

$\left(\frac{f}{g}\right)$ (x)is defined for all

x € R except at

denominator = 0

Here denominator = 6x -1 = 0

$= \ x \ = \frac{1}{6}$

Hence domain of $\left(\frac{f}{g}\right)$

(x)is R $-\left\{\frac{1}{6}\right\}$

9. If $f(x) = 2x^2 + 3$,

$g(x) = 5x - 2$ then find

a) fog

b) gof

c) fof

d) gog

Solution:

Given: $f(x) = 2x^2 + 3$,

$g(x) = 5x - 2$

a) fog = fog(x)

$= f[g(x)] = 2[g(x)]^2 + 3$

$= \ 2(5x - 2)^2 + \ 3$

= 2(25-20x+4) +3

$= 50x^2 - 40x + 11$

b) gof = (gof)(x) = g[f(x)]

= 5[f(x)] – 2

$= 5(2x^2 + 3) - 2$

$= 10x^2 + 13$

c) fof = (fof)(x) = f[f(x)]

$= 2[f(x)]^2 + 3$

$= 2(2x^2 + 3)^2 + 3$

$= 2(4x^2 + 12x^2 + 9) + 3$

$= 8x^2 + 24x^2 + 21$

d) gog = (gog)(x) = g[g(x)]

= 5[g(x)] – 2 = 5(5x-2)-2

= 25x – 12