Class Exercise 3

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Functions and Relations

1. What is the range and domain of this function: {(0, 1), (2, 3), (-1, 3), (4, 5)}.

Range $\{1, 3, 3, 5\}$ y values

Domain $\{-1, 0, 2, 4\}$ x values

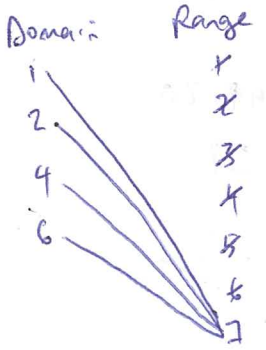
2. Which of the following relations are functions? Give reasons.

(a) R = {(1, 7) (2, 7) (4, 7) (6, 7)} ← function

(b) R = {(1, 2) (1, 3) (1, 4) (1, 5)} ← relation

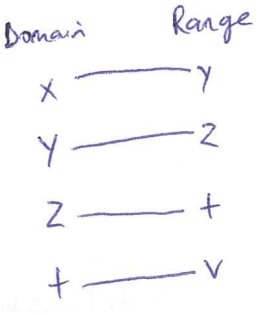
(c) R = {(x, y) (y, z) (z, t) (t, v)} ← function

(a) $R = \{(1,7)(2,7)(4,7)(6,7)\}$



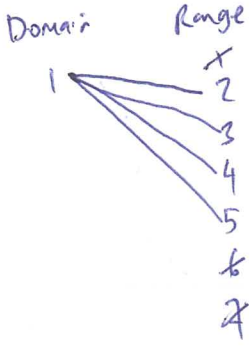
Several elements in domain equal one range.
Function

(c) $\{(x,y)(y,z)(z,t)(t,v)$



(c) is a function because each element of domain is paired with exactly one element of the range.

(b) $R = \{(1,2)(1,3)(1,4)(1,5)$



Relation - one element in domain in one of equal multiple in range

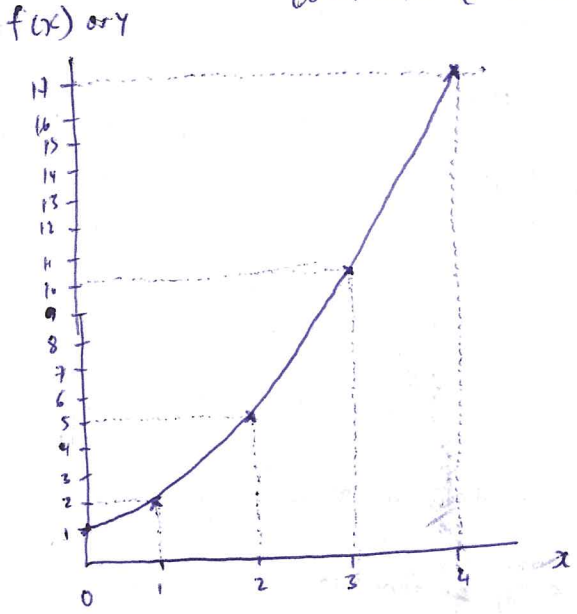
3. Draw the following Function:

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

When $x = (0, 1, 2, 3, 4)$.

$f(0) = 0^2 + 1 = 1$
$f(1) = 1^2 + 1 = 2$
$f(2) = 2^2 + 1 = 5$
$f(3) = 3^2 + 1 = 10$
$f(4) = 4^2 + 1 = 17$

Co-ordinates $(0,1)(1,2)(2,5)(3,10)(4,17)$



4. Given the following functions: $f(x) = x^3 - 4x + 1$, $g(x) = 6x^2 - x - 2$, $h(x) = 6x + 2$. Determine the following:

i. $f(4) - g(2)$

ii. $-5[g(h(1))]$

(i) $f(4) = 4^3 - 4(4) + 1$
$f(4) = (64) - 16 + 1$
$f(4) = 64 - 16 + 1$
$f(4) = 49$

$g(2) = (6(2)^2) - 2 - 2$
$g(2) = 24 - 2 - 2$
$g(2) = 20$

$f(4) - g(2) = 49 - 20$
$f(4) - g(2) = 29$

(ii) $h(1) = 6 \times 1 + 2$
$h(1) = (6) + 2$
$h(1) = 8$

$-5[g(8)]$

$g(8) = 6 \times 8^2 - 8 - 2$
$g(8) = 384 - 8 - 2$
$g(8) = 374$

$-5[374]$

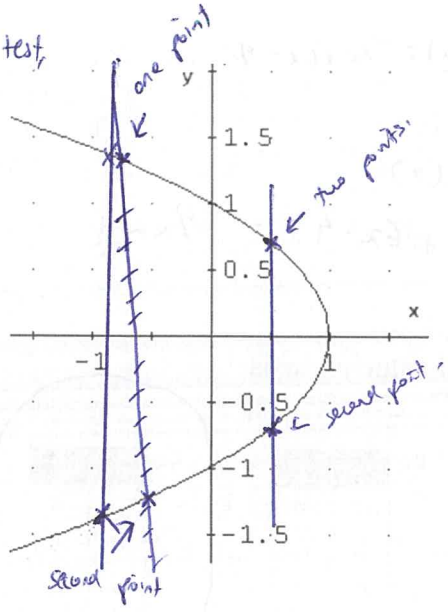
$= -1870$

~~$-5(-1870(8))$~~
~~$-5(-49,960)$~~
~~$= 249,800$~~

5. Is the graph shown below is a function? Briefly state your reasoning.

This graph is not a function because if we use the vertical line test,

→ you can see the line passes through more than one point in the graph



6. Function h is defined by

$h(x) = 3x^2 - 7x - 5$, find $h(x - 2)$. (linear function)

$h(x-2) = (3x-2)^2 - 7(x-2) - 5$ (substitute)

$h(x-2) = 3(x^2 - 4x + 4) - 7x - 14 - 5$ (expand & group like terms)

$= 3x^2 - 12x + 12 - 7x + 14 - 5$

$= 3x^2 - 19x + 21$

$h(x-2) = 3x^2 - 19x + 21$

7. Functions f and g are defined by

$f(x) = 1/x + 3x$ and $g(x) = -1/x + 6x - 4$

$f(x) = 1/x + 3x$ and $g(x) = -1/x + 6x - 4$

find $(f+g)(x)$ and its domain.

$(f+g)(x) = f(x) + g(x)$

$1/x + 3x + (-1/x + 6x - 4) = 9x - 4$

8. The correct Table of value $y = x^2$ is

A.

x	y
-2	-4
-1	-1
0	0
1	1
2	4

B.

x	y
-2	-4
-1	-2
0	0
1	2
2	4

C.

x	y
-2	4
-1	1
0	0
1	1
2	4

D.

x	y
-2	4
-1	2
0	0
1	2
2	4

because x^2

$-2 \times -2 = 4$

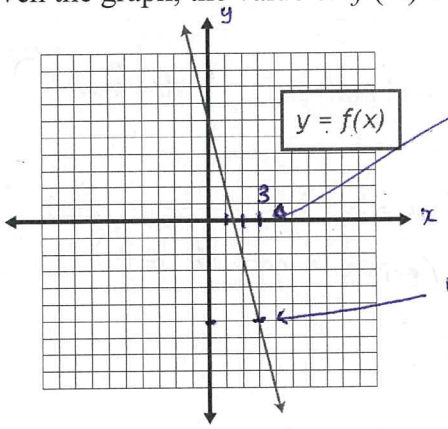
$-1 \times -1 = 1$

$0 \times 0 = 0$

$1 \times 1 = 1$

$2 \times 2 = 4$

9. Given the graph, the value of $f(3)$ is what?

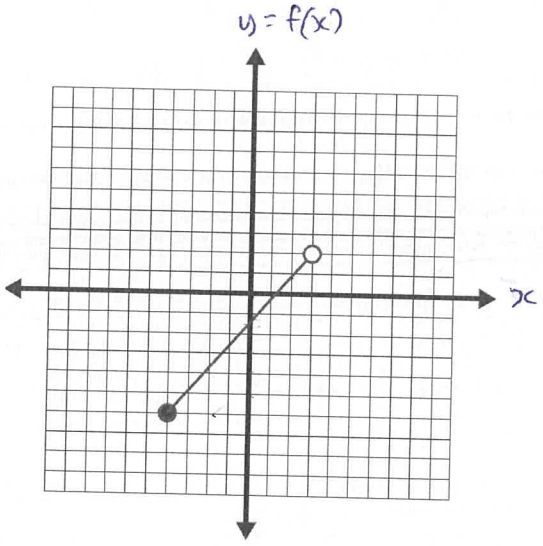


$f(3)$ = find 3 along x axis

where $f(x)$ intercepts $3x$.

so the value of $f(3)$ is -6

10. What is the domain and what is the range of this graph?



Domain x	Range $y = f(x)$
-4	-6
-2	-4
0	-1.5
2	1
3	2