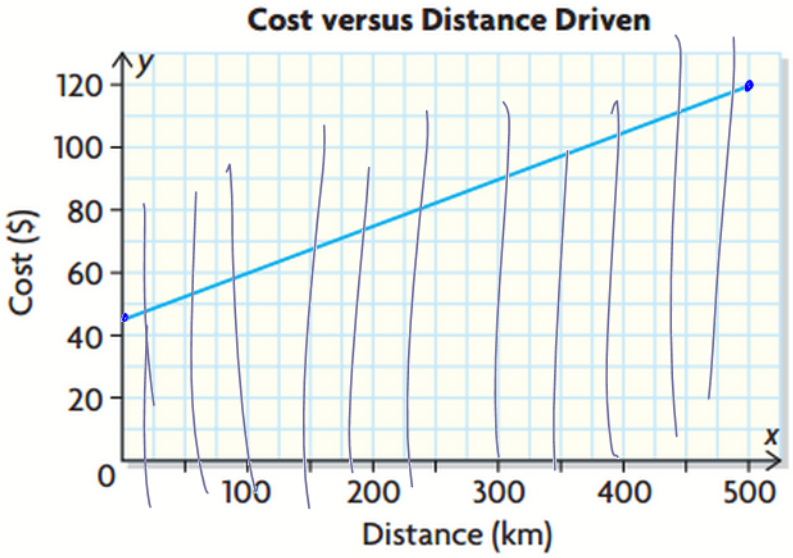
Hub Check - pg 12

12. The cost of renting a car depends on the daily rental charge and the number of kilometres driven. A graph of cost versus the distance driven over a one-day period is shown.



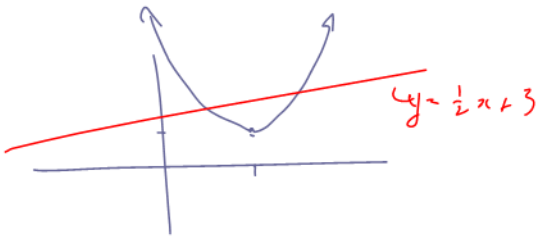
a) What are the domain and range of this relation?
b) Explain why the domain and range have a lower limit.
c) Is the relation a function? Explain.

$D: \{x \in \mathbb{R} \mid 0 \le x \le 500\}$
$R: \{y \in \mathbb{R} \mid 45 \le y \le 120\}$

↳ divisions

↳ yes - Passes the V.L.T.

Chapter 1 – Introduction to Functions



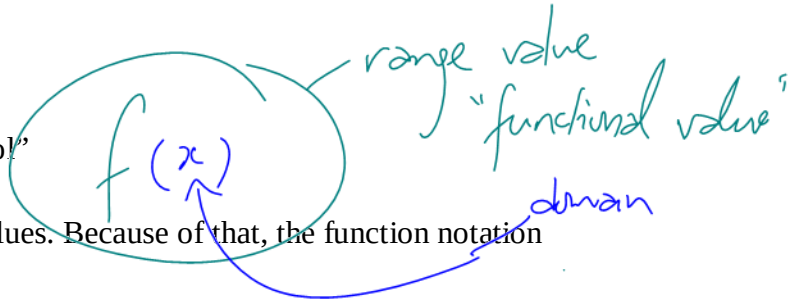
1.2 Function Notation

Here we learn a new way for describing a function, algebraically. You have been using the following form for functions (in this example, for a quadratic):

$$y = 3(x-2)^2 + 1$$

A much more useful way of writing function is to use Function Notation. The above quadratic (**which we call a "function of *x*" because the domain is given as *x*-values**) can be written as:

$$f(x) = 3(x-2)^2 + 1$$



This new notation is so useful because the "symbol"

shows **BOTH** the **DOMAIN** and the **RANGE** values. Because of that, the function notation shows us **points** on the graph of the function.

$(x, f(x))$

Let's do some examples (from your text on pages 23 – 24)

Example 1.2.1

4. Evaluate $f(-1)$, $f(3)$, and $f(1.5)$ for

a) $f(x) = (x-2)^2 - 1$ **b)** $f(x) = 2 + 3x - 4x^2$

$f(-1) = (-1-2)^2 - 1$

$= 8$

$\Rightarrow$ point $(-1, 8)$

$(-1, f(-1))$

b) $f(\square) = 2 + 3\square - 4(\square)^2$

$f(\textcircled{3}) = 2 + 3\textcircled{3} - 4(\textcircled{3})^2$

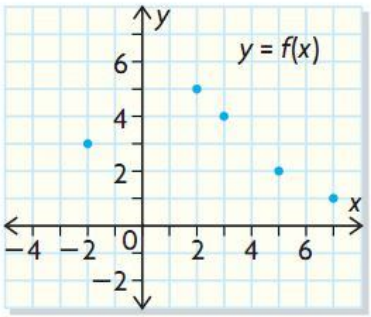
$f(3) = 2 + 3(3) - 4(3)^2$

$= -25$ $\Rightarrow$ pt $(3, -25)$

$(x, f(x))$ ⇝ $\{(-2,3), (2,5), (3,4), (5,2), (7,1)\}$

Example 1.2.2

6. The graph of $y = f(x)$ is shown at the right.



a) State the domain and range of f.

b) Evaluate.

i) $f(3) = 4$

ii) $f(5) = 2$

iii) $f(5-3) = f(2) = 5$

iv) $f(5) - f(3)$
$= 2 - 4$
$= -2$

$D_f = \{-2, 2, 3, 5, 7\}$

$R_f = \{3, 5, 4, 2, 1\}$

Example 1.2.3

11. For $g(x) = 4 - 5x$, determine the input for x when the output of $g(x)$ is

a) -6 **b)** 2

$g(x) = -6$ ⇒ what's x?

$-6 = 4 - 5x$
⇒ $-6 - 4 = -5x$
⇒ $-10 = -5x$
⇒ $x = +2$

b) $2 = 4 - 5x$
⇒ $5x = 4 - 2$
∴ $x = \frac{2}{5}$

Example 1.2.4

7. For $h(x) = 2x - 5$, determine

a) $h(a)$

b) $h(b+1)$

c) $h(3c-1)$

d) $h(2-5x)$

a) $h(a) = 2(a) - 5$

b) $h(b+1) = 2(b+1) - 5$
$= 2b + 2 - 5$
$= 2b - 3$

c) $h(3c-1) = 2(3c-1) - 5$
$= 6c - 7$

d) $h(2-5x) = 2(2-5x) - 5$
$= 4 - 10x - 5$
$= -10x - 1$

Example 1.2.5

12. A company rents cars for \$50 per day plus \$0.15/km.

a) Express the daily rental cost as a function of the number of kilometres travelled.

b) Determine the rental cost if you drive 472 km in one day.

c) Determine how far you can drive in a day for \$80.

a) Domain : km in x
Range : Cost : $C(x)$

$$C(x) = 50 + 0.15x$$

b) $x = 472 \Rightarrow C(472) = 50 + 0.15(472)$
$= \$120.80$ — give units (plus \$ have 2 decimal places)

c) $C(x) = \$80$

$\Rightarrow 80 = 50 + 0.15x$

$\Rightarrow 30 = 0.15x$

$\Rightarrow x = 200$ km.

Class/Homework – Page 23 #8b, 9bc, 10, 14, 15, 16