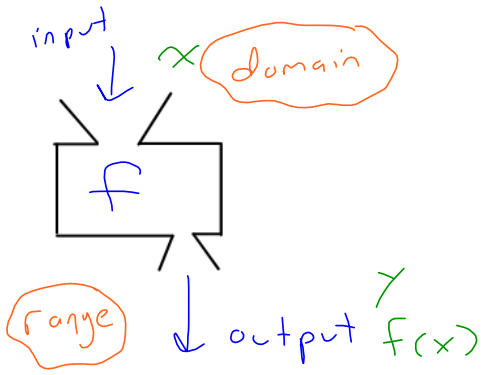
MCF3M Unit 1 Lesson 5

Domain and Range

We often visualize a function as a machine. This machine takes input and produces output, based on some rule. The "rule" is usually defined by an equation.

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



The **domain** is the set of numbers that we can use as input.
The **range** is the set of numbers that we can get as output. (Depends on domain)

First we will discuss some new mathematical symbols useful for describing the domain and range of a function. These symbols are used to describe "sets".

What do the following symbols mean?

{ } ← set of

∈ ← "element of" or belongs to

R real numbers

I integers -3, -2, -1, 0, 1, 2...

$x \leq 7$ less than or equal to 7

$x > 8$ greater than 8

≠ not equal

$3 \leq x \leq 5$

$x \geq 3$ and $x \leq 5$

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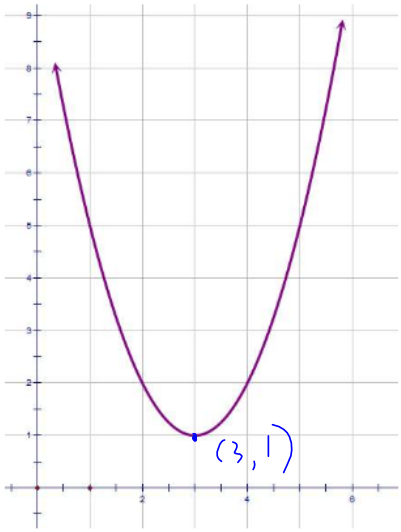
Find the domain and range of each function given its graph below.

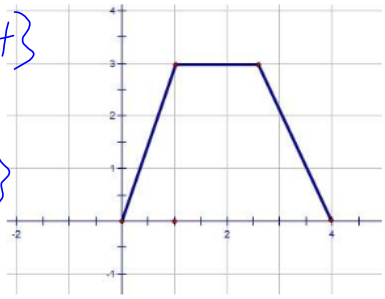
$D: \{x \in R\}$

$R: \{y \in R \mid y \geq 1\}$



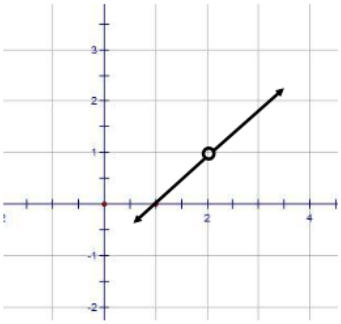
$D: \{x \in R \mid 0 \leq x \leq 4\}$

$R: \{y \in R \mid 0 \leq y \leq 3\}$



$D: \{x \in R \mid x \neq 2\}$

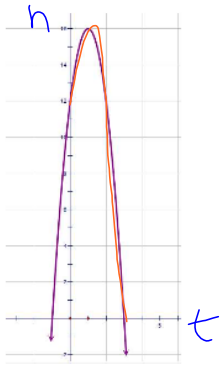
$R: \{y \in R \mid y \neq 1\}$



MCF3M **Unit 1 Lesson 5**

A dirt bike goes over a large ramp. The height of the bike is given by the quadratic function $h(t)=-4t^2+8t+12$, where h(t) is the height (in feet) t seconds after leaving the end of the ramp.

The graph of this function is shown below (generated from graphing software). Suggest a domain and range for this function.



$D: \{t \in R \mid 0 \le t \le 3\}$

$R: \{h(t) \in R \mid 0 \le h(t) \le 16\}$

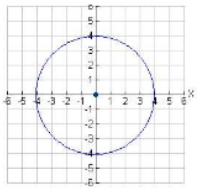
Note: We can do this question without the graph! (learn this later)

Find the domain of and range for each relationship below.

{(1, 7), (2, 5), (3, 9), (4, 5)}

$D: \{1, 2, 3, 4\}$ or $D: \{x \in I \mid 1 \le x \le 4\}$

$R: \{5, 7, 9\}$



$D: \{x \in R \mid -4 \le x \le 4\}$

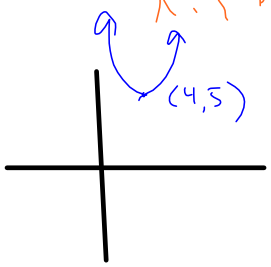
$R: \{y \in R \mid -4 \le y \le 4\}$

Year	Median Income
1998	$56800
2003	$61300
2007	$59800
2009	$61700

$D: \{1998, 2003, 2007, 2009\}$

$R: \{\$56800, \$61300, \$59800, \$61700\}$

$f(x) = 2(x - 4)^2 + 5$



$D: \{x \in R\}$

$R: \{f(x) \in R \mid f(x) \ge 5\}$

$y = \sqrt{x}$

$D: \{x \in R \mid x \ge 0\}$

$R: \{y \in R \mid y \ge 0\}$

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

$D: \{x \in R \mid x \ne 0\}$

$R: \{y \in R \mid y \ne 0\}$