Domain:

The domain of a function is the number set to which the independent variable belongs. Let's review some number sets:

Natural ($\mathbb{N}$) $= \{1, 2, 3, \ldots\}$

Integer ($\mathbb{Z}$) $= \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$

Rational ($\mathbb{Q}$) = Set of numbers that can be expressed as $\frac{a}{b}$ where a and b are integers.

Real ($\mathbb{R}$) = Set of Rationals combined with **irrationals** (numbers with infinite, non-repeating decimals such as π or $\sqrt{2}$).

Complex ($\mathbb{C}$) = Set of numbers in form $a + bi$ where $a, b \in \mathbb{R}$ and $i = \sqrt{-1}$.

We typically neglect to specify a domain when defining a function, therefore assuming that the domain is $\mathbb{R}$. Note, however, if $B = f(n) = n/33$ is the number of school busses needed as a function of the number of students in a school district (technically $S = f(n) = \lceil n/33 \rceil$.), the domain for B is $\mathbb{N}$ and the range is also $\mathbb{N}$, written $f : \mathbb{N} \longrightarrow \mathbb{N}$.

1. Determine the best set(s) of numbers suited to the domain and range of these functions.

   (a) The amount of money an electrician makes as a function of time in hours.

   (b) The population of a town as a function of time in years.

   (c) The number of houses sold by a realtor as a function of the selling price.

   (d) The temperature as a function of the date in a year.

   (e) The length of the diagonal of a square as a function of its side.

2. (a) Sketch graphs of (i) an increasing function and (ii) a decreasing function.

(b) Write definitions for increasing and decreasing functions in terms of the independent variable (x) and the dependent variable (y).

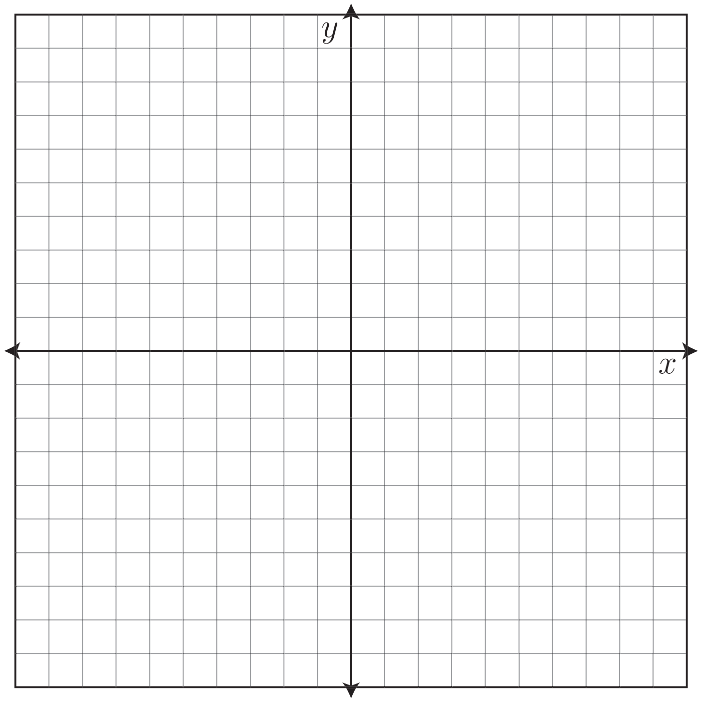
Linear Functions:

3. Give an example of a direct (linear) proportion; include units of the constant of proportionality.

4. Complete the table below:

x	-6	-3	0	3	6
$y = \frac{2}{3}x + 5$					

5. Sketch the graph of the table in (#4).



6. Take a moment to note how the changes in the x and y variables in the two previous questions are manifested.

6. Use the table below to answer the following questions:

x	0	1	2	3	4
$f(x)$	9	8	5	0	-7

(a) find $f(4)$: _______

(b) Solve $f(x) = 0$: $x =$_______

(c) Find the average rate of change from $x = 0$ to $x = 2$ and then from $x = 2$ to $x = 4$. What do you observe from your results?

7. The population of Half Moon Bay since 1995 can be modeled by the function $P(t) = 10000(1.012)^t$ where t is in years. Find the average rate of growth in population from 1995 to 1997 and from 1999 to 2001. What do you observe from your results?