Domain and Range

1. Take each of the functions below and find their domains. Express each domain using both a number line sketch and *interval notation*. If interval notation is inappropriate, use *set notation*. Not to be confused with *set-builder notation*.

   a) f, where $f(x) = \dfrac{3}{x-5}$

   b) F, where $F(r) = \dfrac{2}{r^2 - 8r}$

   c) k, where $k(t) = 20t + 3$

   d) g, where $g(x) = \dfrac{24}{x^2 + 1}$
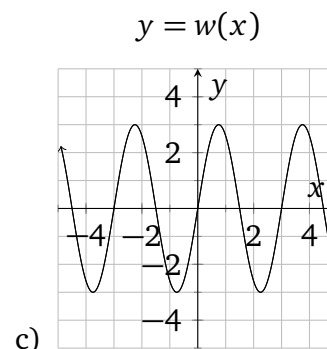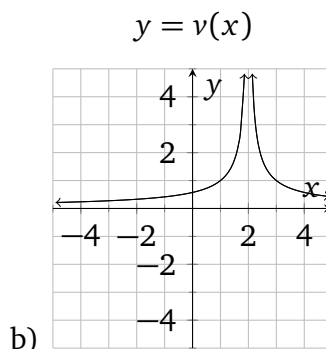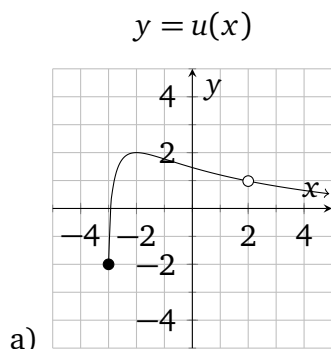
   e) ℓ, where $\ell(x) = \sqrt{x + 43}$

   f) V, where $V(T)$ is the volume of one kilogram of *liquid* water at sea level, where T is the temperature in $^\circ C$.

   g)

x	h(x)
1	4
14	20
20	22
32	18

   h) Rev, where $\text{Rev}(n)$ is the revenue at a movie theater when they sell n tickets to a particular show. This theater has 300 seats.

2. The graph of a function is given in each part below. Express the domain using *interval notation*.

$$y = u(x)$$

$$y = v(x)$$

$$y = w(x)$$

a)

b)

c)

3. An NBA basketball game lasts 48 minutes. Let q be a function of x, where $q(x)$ is the number of points that the home team has x minutes after a particular game begins. For example, if $q(10.5) = 20$ it means at a moment in time 10.5 minutes after the game started, the home team has 20 points.

a) What kinds of things are the input numbers?

b) What kinds of things are the output numbers?

c) Express the domain of q *in words* and in *interval notation*.

4. A function f is defined by $f(x) = \dfrac{x^2 - x + 1}{x^2 + x + 1}$. Use GeoGebra (www.geogebra.org) or your graphing calculator to graph this function. Based on your graph, express the domain of f using interval notation.

5. A function B is defined by $B(x) = \dfrac{\sqrt{x + 5}}{x^3 - 9x + 9}$. Use GeoGebra (www.geogebra.org) or your graphing calculator to graph this function. Based on your graph, express the domain of f using interval notation.
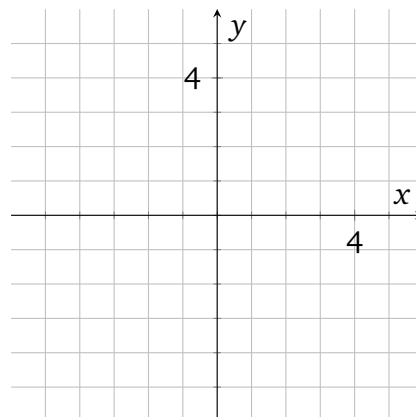
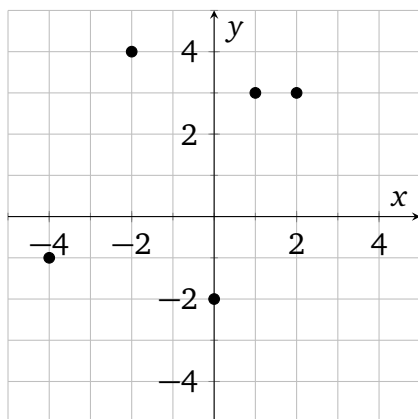6. A function g has the formula $g(x) = |x - 2| - 3$.

   a) Make a table for g.

x	$g(x)$
-2	
-1	
0	
1	
2	
3	
4	

   b) Make a graph of g.

   c) Express the domain and range of g in interval notation.

7. A function named Q has the graphical representation below.

$$y = Q(x)$$

   a) Express Q as a set of ordered pairs. Any time you are expressing a *set* or *list*, the standard math notation is to use braces: {, }.

   b) Express the domain and range of Q in set notation.

8. A function named C is given by $\{(1,2),(2,4),(3,8),(4,8),(5,12)\}$.

   a) What are the domain and range of C? Give your answers using set notation.

   b) Give a graphical representation of C.

   c) What is $C(2)$?

   d) Solve the equation $C(x) = 12$.

9. In order to make table sugar, a factory had to purchase \$20,000 of machinery. Beyond that, there are costs of materials, labor, and transportation that go into producing x pounds of sugar. If $f(x)$ is the total cost in dollars to a factory that will make x pounds of sugar, what are the domain and range for f?