Functions

**Definition 0.1.** A function $f$ is a rule that assigns to each element $x$ in a set $A$ (called the domain) exactly one element, called $f(x)$ in a set $B$ (called the range).

**Convention 0.1** (Domain). Then the domain is not explicit we use the domain convention: the domain of the function is the set of all possible inputs that the rule returns a real number.

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

1. Let $C$ be the function that takes percentages, $x$, and returns course marks:

   $$C(x) = \begin{cases} 
   0 & \text{if } 0 \leq x < 57 \\
   .1x - 5 & \text{if } 57 \leq x \leq 90 \\
   4.0 & \text{if } 90 < x \leq 100 
   \end{cases}$$

   (a) Find $C(75)$.

   (b) Find the percentage(s), $x$ so that $C(x) = 4.0$.

   (c) Given that $C$ is a function, what is the domain of $C$?

2. Let $f$ be a function defined algebraically by: 

   $$f(x) = \frac{1}{1-x^2}$$

   (a) Find $f(2.2)$.

   (b) Find $f(a+h)$.

   (c) Given that $f$ is a function, use the domain convention to find the domain of $f$?
The cartesian plane uniquely identifies all the points on a plane with two coordinates called an ordered pair.

For example, the point (-2.5,4) corresponds to the point 2.5 units to the left of the y-axis, and 4 units above the x-axis.

Write down the ordered pair for the following points:

- (a) A
- (b) B
- (c) C

3. Identify the ordered pair (2, -4) on the axes above.

4. The cartesian plane divides the plane into four quadrants. The first quadrant is the upper right, where both the x and y coordinates are positive. On the cartesian plane above, identify the 2nd and 4th quadrants.

**Definition 0.2.** The graph of a function $f$ is the set of ordered pairs $(x, y)$ where $y = f(x)$.

5. Consider the function defined below:

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>16</td>
</tr>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Most of the graph of $f$ is graphed on the right. Look at the definition of a graph and finish graphing the function $f$.

**Convention 0.2 (Vertical Line).** A curve in the coordinate plane is the graph of a function if and only if no vertical line intersects the curve more than once.