5.1 - What is a Function?

*Quiz 4 and Turn in packet of Unit 4 work

*Light after Quiz Reading

*Data vs. Plots vs. Equations

*Interval Notation

*3 part definition of a Function

*Assignment

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5.1 Data - Plots - Equations

When we are trying to measure and show relations between two variables, we can display that information in three important ways:

a) record the paired data in a table of values
   - keep them paired

b) plot the individual data pairs on a 2-D coordinate system
   - for now as discrete data points, but for a better picture we find more data

c) an equation showing the algebraic relationship between the variables in each pair
   - requires the relationship to follow a constant rule

The first two relationships usually show a discrete (finite) relationship while the equation can indicate a continuous (infinite) relationship [The equation produces an infinite number of data points]
5.1 3 Displays of Data Example

Example #1 - Height of a person on a ferris wheel

\[ t = \text{time on a ferris wheel} \]
\[ h = \text{height from ground of person on ferris wheel} \]

Paired data

<table>
<thead>
<tr>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>22.5</td>
<td>60</td>
</tr>
<tr>
<td>45</td>
<td>110</td>
</tr>
<tr>
<td>67.5</td>
<td>60</td>
</tr>
<tr>
<td>90</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ h = 90 \sin(\frac{\pi t}{10}) \]

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5.1 Interval Notations

When stating Domains and Ranges, we often express them as intervals of possible numeric values. Here are some ways we write intervals...

\[ x < \sim -7 \]
\[ x \geq 8 \]

<table>
<thead>
<tr>
<th>Common Intervals on the Number Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>All numbers (x) between (a) and (b), (x) possibly equal to either (a) or (b)</td>
</tr>
<tr>
<td>All numbers (x) between (a) and (b), (x \neq a) and (x \neq b)</td>
</tr>
<tr>
<td>All numbers (x) between (a) and (b), (x \neq a) and (x \neq b) and (x) possibly equal to (a)</td>
</tr>
<tr>
<td>All numbers (x) between (a) and (b), (x \neq a) and (x) possibly equal to (b)</td>
</tr>
</tbody>
</table>
5.1 What is a Function

A Function is a procedure for assigning a unique output to any allowable input

A function is a "package" consisting of three parts

1) an equation of the form
   \[ y = "a \text{ mathematical expression only involving the variable } x" \]
   also listed as \[ y = f(x) \] where we say \( f(x) \) is the rule

2) a set of values (D) that we are allowed to plug into \( f(x) \) called the domain of the function

3) a set of values (R) that are outputs of \( f(x) \), where \( x \) varies over the domain and \( R \) is referred to as the range of the function

\( x \) is often referred to as the independent variable in a function where \( y \) is referred to as the dependent variable.

Assignment (Due "Thursday, October 8")

1) Read these sections of Chapter 5
   5.1, 5.2 and 5.4

2) Chapter 5 Problems Packet
   a) 5.8 and 5.9 leaving room for "fix" question

   b) 5.1 at least look at

   *) Looking for:
      neat, complete, organized, and well labeled

   -This is a very quick Chapter compared to 4