Transformations of Functions and Graphing Video Lecture
Sections 8.2 and 8.3

Course Learning Objectives:

1) Graph linear and quadratic equations.
2) Be able to find the domain, range and transformations of a function.

Weekly Learning Objectives:

1) Graph linear and nonlinear functions including quadratics, square roots and absolute values.
2) Apply vertical and horizontal shifts to graphs.
3) Reflect graphs horizontally and vertically.
4) Find the domain and range of a function from its graph.
Transformations of Functions and Graphing

Graphs of Common Functions:

\[ f(x) = x \]

\[ f(x) = \sqrt{x} \]

Domain: \[ \text{Domain} \]
Range: \[ \text{Range} \]

\[ f(x) = |x| \]

\[ f(x) = \frac{1}{x} \]

Domain: \[ \text{Domain} \]
Range: \[ \text{Range} \]
### Summary of Transformations:

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Shift Up $k$</td>
<td>$f(x) = x^2 + 1$</td>
</tr>
<tr>
<td>Vertical Shift Down $k$</td>
<td>$f(x) = \sqrt{x} - 2$</td>
</tr>
<tr>
<td>Horizontal Shift Left $k$</td>
<td>$f(x) = (x + 3)^2$</td>
</tr>
<tr>
<td>Horizontal Shift Right $k$</td>
<td>$f(x) =</td>
</tr>
<tr>
<td>Reflection over the x-axis</td>
<td>$f(x) = -</td>
</tr>
<tr>
<td>Reflection over the y-axis</td>
<td>$f(x) = \sqrt{-x}$</td>
</tr>
</tbody>
</table>
\( f(x) = x^2 - 3 \)

\( f(x) = |x| + 2 \)

\( f(x) = |x-1| \)

\( f(x) = \sqrt{x+4} \)
\[ f(x) = (x-2)^2 + 1 \]

\[ f(x) = |x+3| - 2 \]

\[ f(x) = -|x| \]

\[ f(x) = \sqrt{-x} \]

\[ f(x) = -\sqrt{x-1} + 2 \]

\[ f(x) = -|x+5| + 3 \]