2.6 - Graphing Techniques: Transformations

Objectives: To apply transformations to functions and their graphs.
How does changing certain aspects of a function affect its graph?

**Vertical shift:** \( y = f(x) + k \)
- \( k > 0 \) shifts up
- \( k < 0 \) shifts down

**Identify the parent function**

**Write the function to match the graph**

\[
\begin{align*}
y &= x^2 \\
f(x) &= x^2
\end{align*}
\]

\[
\begin{align*}
y &= x^2 + 3 \\
f(x) &= x^2 + 3
\end{align*}
\]
How does changing certain aspects of a function affect its graph?

Horizontal shift: \( y = f(x - h) \)
- \( h > 0 \) shifts right
- \( h < 0 \) shifts left

Identify the parent function

Write the function to match the graph

\[ y = x^3 \]
\[ y = (x+4)^3 \]
How does changing certain aspects of a function affect its graph?

Vertical stretch or compression: \( y = af(x) \)
- \( a > 1 \) vertical stretch
- \( 0 < a < 1 \) vertical compression

| Identify the parent function | \( y = |x| \) |
|------------------------------|---------------|
| Write the function to match the graph | \( y = 2|x| \) |
How does changing certain aspects of a function affect its graph?

reflection about the x-axis: \( y = -f(x) \)

Identify the parent function

Write the function to match the graph
How does changing certain aspects of a function affect its graph?

reflection about the y-axis:  \( y = f(-x) \)

Identify the parent function

Write the function to match the graph

\[ x | y \\
-4 | \sqrt{(-4)} = \sqrt{4} = 2 \]

\((-4, 2)\)
Determine the function obtained from a series of transformations

\[ f(x) = x^2 \]

1. shifted right 4 units \[ f(x) = (x - 4)^2 \]
2. shifted up 3 units \[ f(x) = (x - 4)^2 + 3 \]
3. reflected about the y-axis \[ f(x) = (-x - 4)^2 + 3 \]

\[ f(x) = (-x - 4)^2 + 3 \]
Determine the function obtained from a series of transformations

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

1. shifted left 5 units \[ f(x) = |x+5| \]
2. vertical stretch of 2 \[ f(x) = 2|x+5| \]
3. reflected about the x-axis \[ f(x) = -2|x+5| \]

\[ f(x) = -2|x + 5| \]
HOMEWORK:

pg. 127

#s: 7 - 18 all, 19 - 33 odds