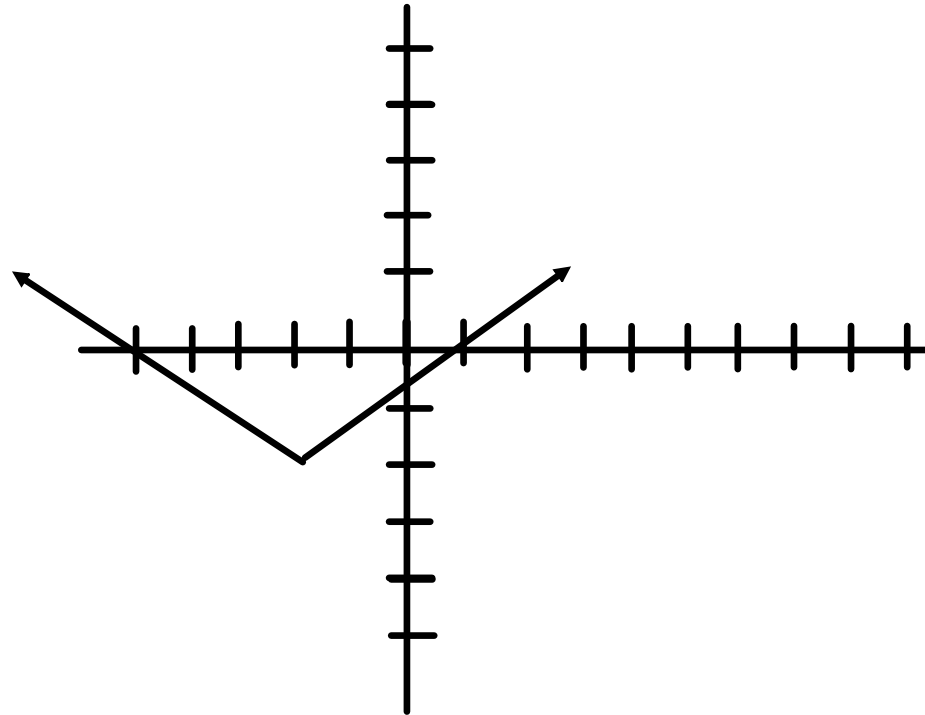
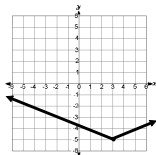


Bellwork: Find the key features of the function graphed below:



Homework 2.1 Solutions

1. Graph:



I/D intervals: Increasing: $(3, \infty)$, decreasing: $(-\infty, 3)$

+/- intervals: Positive: $(-\infty, -7) \cup (13, \infty)$, negative: $(-7, 13)$

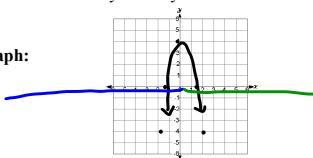
Max and min: Minimum: $(3, -5)$

Intercepts: $(-7, 0)$, $(13, 0)$, and $(0, -\frac{3}{2})$

End behavior: $\lim_{x \rightarrow -\infty} f(x) = \infty$, $\lim_{x \rightarrow \infty} f(x) = \infty$

Symmetry: No symmetry

2. Graph:



I/D intervals: Increasing: $(-\infty, 0)$, decreasing: $(0, \infty)$

+/- intervals: Positive: $(-1.41, 1.41)$, negative: $(-\infty, -1.41) \cup (1.41, \infty)$

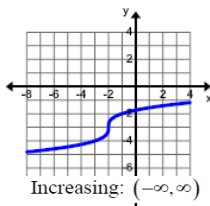
Max and min: Maximum: $(0, 4)$

Intercepts: $(-1.41, 0)$, $(1.41, 0)$, and $(0, 4)$

End behavior: $\lim_{x \rightarrow -\infty} f(x) = -\infty$, $\lim_{x \rightarrow \infty} f(x) = -\infty$

Symmetry: even

3. Graph:



I/D interval: Increasing: $(-\infty, \infty)$

+/- intervals: Positive: $(25, \infty)$, negative: $(-\infty, 25)$

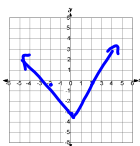
Max and min: none

Intercepts: $(25, 0)$ and $(0, -1.740)$

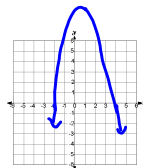
End behavior: $\lim_{x \rightarrow \infty} f(x) = \infty$, $\lim_{x \rightarrow -\infty} f(x) = -\infty$

Symmetry: No symmetry

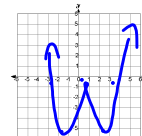
4.



5.



6.



Lesson 2.2 Objectives:

I can find average rate of change for functions

I can transform functions using translations (shifts), dilations (stretches), and reflections

FUNCTION TRANSFORMATIONS

Horizontal Shift: $f(x-h)$ translates (shifts) $f(x)$ to the right h units $f(x+h)$ translates (shifts) $f(x)$ to the left h units

Vertical Shift: $f(x)+v$ translates (shifts) $f(x)$ up v units $f(x)-v$ translates (shifts) $f(x)$ down v units

Reflections: $-f(x)$ reflects $f(x)$ in x -axis (up-down flip) $f(-x)$ reflects $f(x)$ in y -axis (left-right flip)

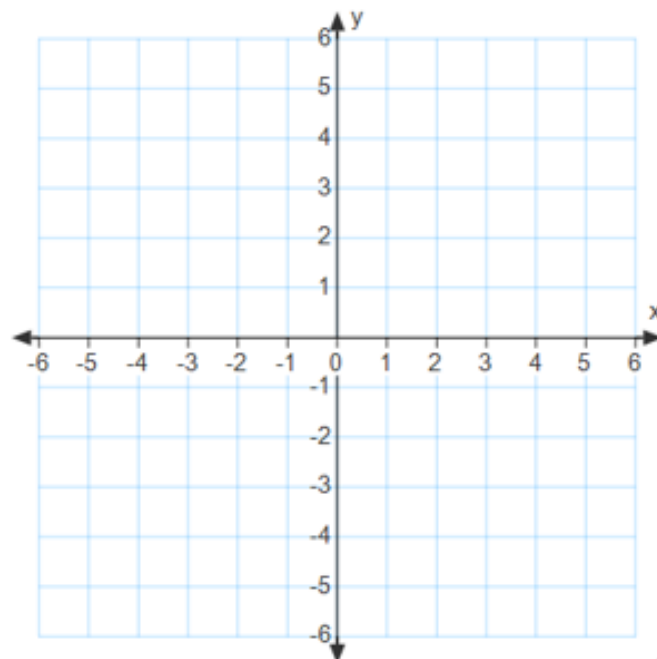
Horizontal Stretch: $f(bx)$; stretches function horizontally by a factor of $\frac{1}{b}$.

Vertical Stretch: $af(x)$; stretches function vertically by a factor of a .

1. Given $f(x)$, graph each new function, without technology, and describe the effect of k on the original graph. Is the new function even odd or neither?

$$f(x) = x^3$$

- $g(x) = -2f(x)$
- $h(x) = f\left(\frac{1}{3}x\right)$
- $j(x) = f(x) + 2$



VOCABULARY

The **average rate of change** of a function over an interval is the ratio of the difference (change) in y over the difference (change) in x .

$$\text{average rate of change} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

The line connecting the two points is called the **secant line**.

Find the average rate of change for $f(x) = 2\sqrt[3]{x+3}$ on the interval $[-3, 5]$.

Example 2:

The table shows the total US farm exports in billions for several years. Find the average decrease per year from 1996 to 2000.

Years	Amount (billions)
1980	41.2
1985	29.0
1990	39.5
1992	43.2
1993	42.9
1994	46.3
1995	56.3
1996	60.4
1997	57.2
1998	51.8
1999	48.5
2000	51.6

Example 3:

Jane is visiting London and took a ride on the London Eye. Her distance in meters from the ground at any given time is shown in the graph at the right. Find her average rate of change from 6 to 21 minutes.

