3.2A Properties of a Function's Graph (Graphically)

- Intercepts
  - Definition of an **x-intercept**

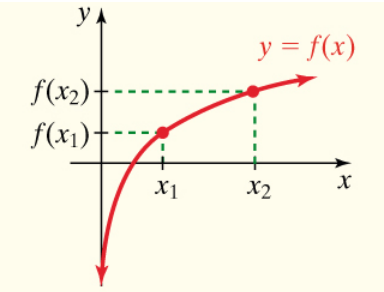
    An **x-intercept** is the ordered pair where the graph crosses or touches the x-axis.
  - Definition of a **y-intercept**

    A **y-intercept** is the ordered pair where the graph crosses or touches the y-axis.
- Domain and Range
  - Definition of Domain

    The **domain** is the set of all first coordinates. (x's)
  - Definition of Range

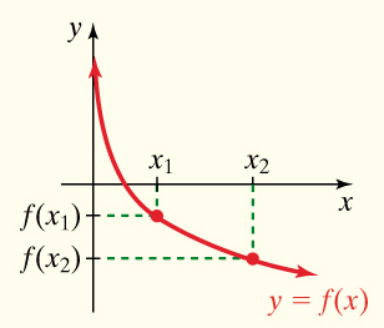
    The **range** is the set of all second coordinates. (y's)
- Increasing, Decreasing, Constant
  - Definition of Increasing

    A function f is increasing on an interval (a, b) if, for any x_1 and x_2 chosen from the interval with $x_1 < x_2$, the $f(x_1) < f(x_2)$. (The graph of an increasing function always goes "up" from left to right.)



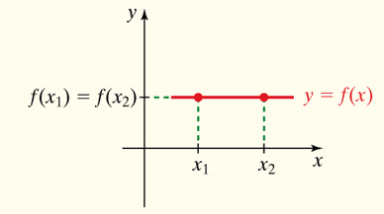
  - Definition of Decreasing

A function f is decreasing on an interval (a, b) if, for any x_1 and x_2 chosen from the interval with $x_1 < x_2$, the $f(x_1) < f(x_2)$. (The graph of an decreasing function always goes "down" from left to right.)



▼ Definition of Constant

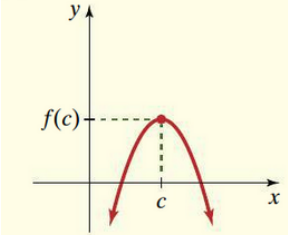
A function f is constant on an interval (a, b) if, for any x_1 and x_2 chosen from the interval with $x_1 < x_2$, the $f(x_1) = f(x_2)$. (The graph of an decreasing function always goes "down" from left to right.)



▼ Relative Minimum or Relative Maximum

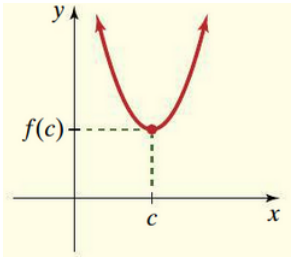
▼ Definition of Relative Maximum

When a function changes from increasing to decreasing at a point $(c, f(c))$, then f is said to have a relative maximum at $x = c$. the relative maximum is $f(c)$.

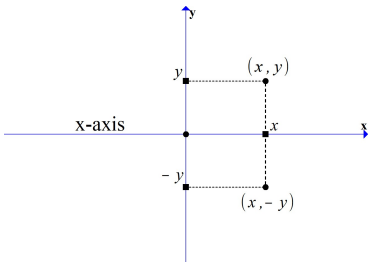


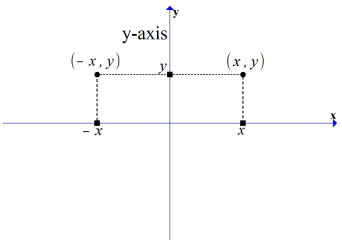
▼ Definition of Relative Minimum

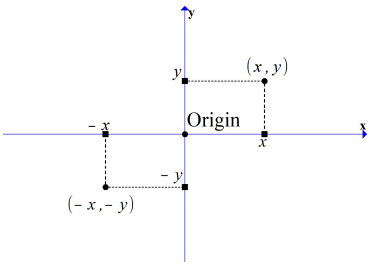
When a function changes from decreasing to increasing at a point $(c, f(c))$, then f is said to have a relative minimum at $x = c$. the relative minimum is $f(c)$.



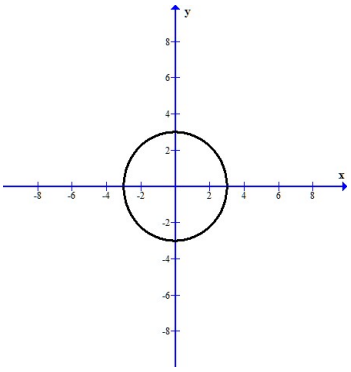
▼ Symmetry

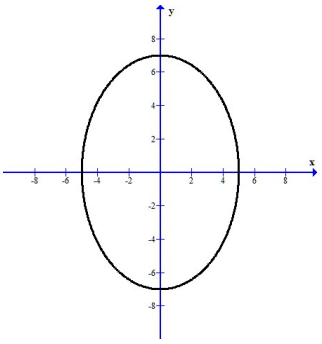


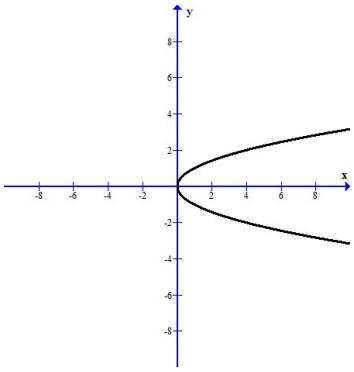


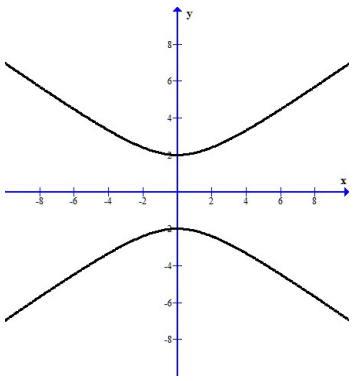
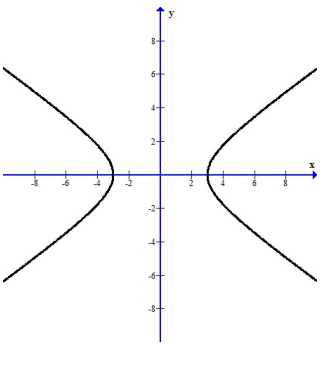
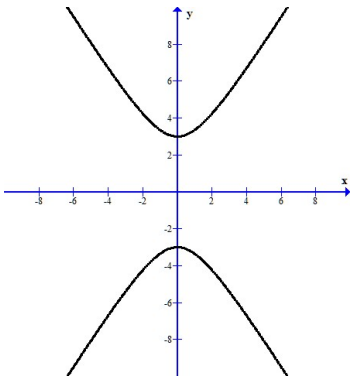


▼ Examples of x-axis symmetry

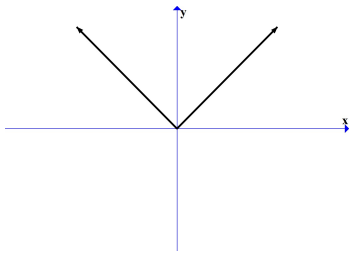
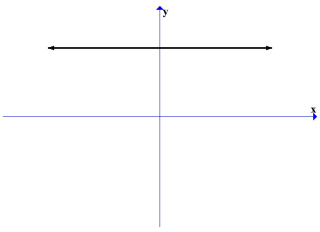
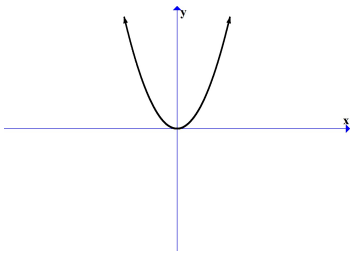
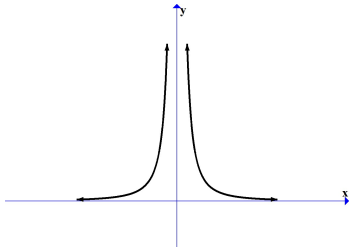
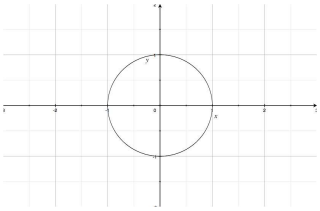
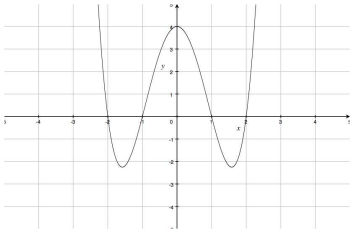




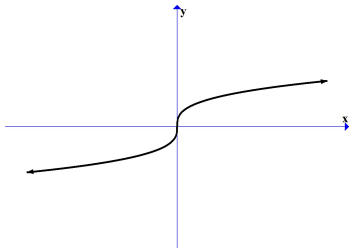
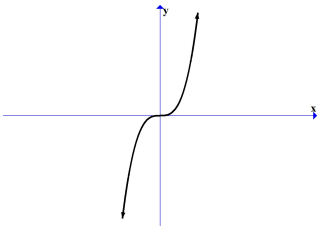
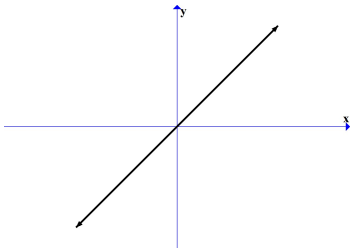


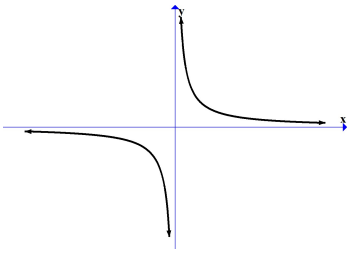




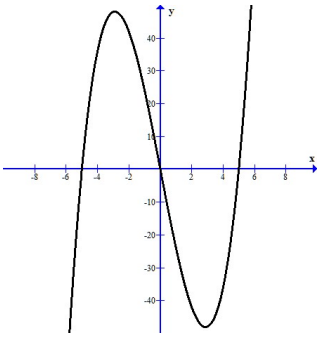
▼ Examples of y-axis symmetry

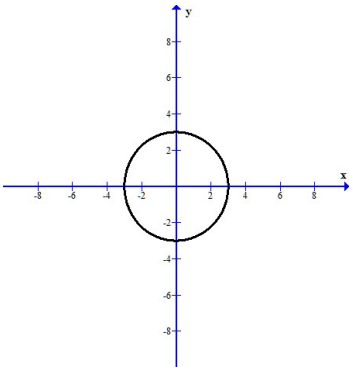







▼ Examples of origin symmetry







▼ Even, Odd or Neither

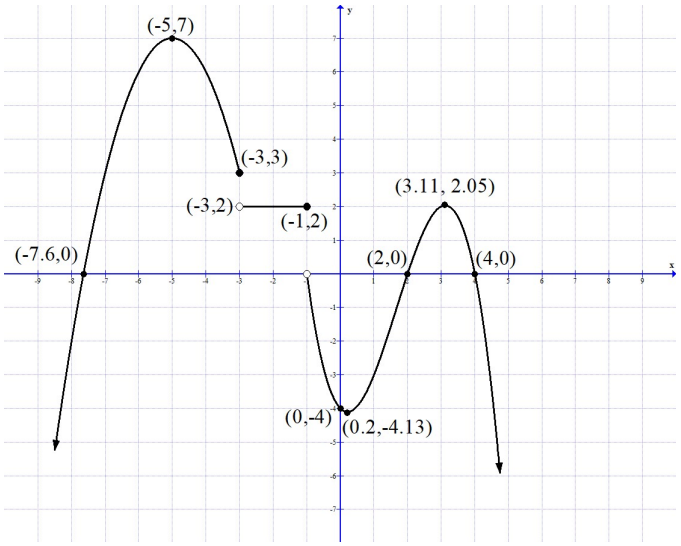
▼ Definition of an Even Function

A function f is **even** if for every x in the domain, $f(x) = f(-x)$. The graph of an even function is symmetric about the y-axis. For each point (x, y) on the graph, the point $(-x, y)$ is also on the graph.

▼ Definition of an Odd Function

A function f is **odd** if for every x in the domain, $-f(x) = f(-x) f(x) = f(-x)$. The graph of an odd function is symmetric about the origin. For each point (x, y) on the graph, the point $(-x, y)$ is also on the graph.

▼ Examples



1. Does the graph on the right represent a function? _____

2. Does the graph on the right represent a one-to-one function?_____

3. Which type of symmetry does the graph have? (circle one) x-axis, y-axis, or origin or no symmetry

4. Identify the intercepts of the graph above. Write the intercepts as ordered pairs.

x-intercept(s): _____

y-intercept(s): _____

5. Use the graph above to determine the domain and range. Use interval notation.

   Domain: _____

   Range: _____

6. Use the graph above to determine the intervals of increasing and decreasing. Use interval notation.

   Increasing: _____

   Decreasing: _____

   Constant: _____

7. Use the graph above

   a. to find the numbers if any at which f has a relative minimum and what are these relative minima? (relative minimum of _____ at x=_____)

   b. to find the numbers if any at which f has a relative maximum and what are these relative maxima? (relative maximum of _____ at x=_____)

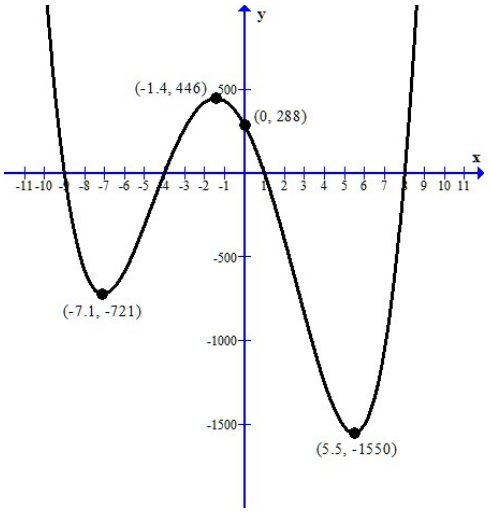
8. Use the graph above to find the following.

a. Find $f(x)$ for x=____?

b. Find $f(x)$ for x=____?

c. For what value of x is $f(x)$=___ ?

d. For what values of x is $f(x) \leq 0$?



1. Does the graph on the right represent a function? _____

2. Does the graph on the right represent a one-to-one function?_____

3. Which type of symmetry does the graph have? (circle one) x-axis, y-axis, or origin or no symmetry

4. Identify the intercepts of the graph above. Write the intercepts as ordered pairs.

x-intercept(s): _____

y-intercept(s): _____

5. Use the graph above to determine the domain and range. Use interval notation.

   Domain: _____

   Range: _____

6. Use the graph above to determine the intervals of increasing and decreasing. Use interval notation.

   Increasing: _____

   Decreasing: _____

   Constant: _____

7. Use the graph above

   a. to find the numbers if any at which f has a relative minimum and what are these relative minima? (relative minimum of _____ at x=_____)

   b. to find the numbers if any at which f has a relative maximum and what are these relative maxima? (relative maximum of _____ at x=_____)

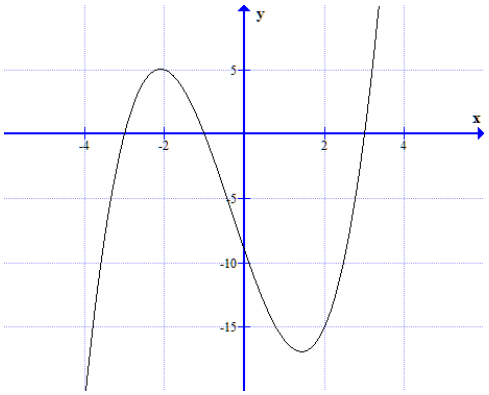
8. Use the graph above to find the following.

a. Find $f(x)$ for x=____?

b. Find $f(x)$ for x=____?

c. For what value of x is $f(x)$=___ ?

d. For what values of x is $f(x) \leq 0$?



1. Does the graph on the right represent a function? _____

2. Does the graph on the right represent a one-to-one function?_____

3. Which type of symmetry does the graph have? (circle one) x-axis, y-axis, or origin or no symmetry

4. Identify the intercepts of the graph above. Write the intercepts as ordered pairs.

x-intercept(s): _____

y-intercept(s): _____

5. Use the graph above to determine the domain and range. Use interval notation.

   Domain: _____

   Range: _____

6. Use the graph above to determine the intervals of increasing and decreasing. Use interval notation.

   Increasing: _____

   Decreasing: _____

   Constant: _____

7. Use the graph above

   a. to find the numbers if any at which f has a relative minimum and what are these relative minima? (relative minimum of _____ at x=_____)

   b. to find the numbers if any at which f has a relative maximum and what are these relative maxima? (relative maximum of _____ at x=_____)

8. Use the graph above to find the following.

a. Find $f(x)$ for x=____?

b. Find $f(x)$ for x=____?

c. For what value of x is $f(x)$=___ ?

d. For what values of x is $f(x) \leq 0$?