

Topics: basic functions, even and odd functions, graphing piecewise functions, relative minima and maxima

Student Learning Outcomes:

1. Students will be able to determine whether a function is even, odd, or neither.
 2. Students will be able to graph a piecewise function.
 3. Students will be able to determine where a function is increasing, decreasing, or constant.
 4. Students will be able to locate relative minimum and relative maximum values of a function on a graph.
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1 Even and Odd Functions

We call f an <i>even</i> function if the graph of f is symmetric with respect to the y axis. In that case, $f(-x) = f(x)$ for every x in the domain.

We call f an <i>odd</i> function if the graph of f is symmetric with respect to the origin. In that case, $f(-x) = -f(x)$ for every x in the domain.

1. Determine whether f is even, odd, or neither.

(a) $f(x) = 17x^3 - 12x^5$

(b) $f(x) = x^3 - 5x^2$

(c) $f(x) = |x|$ This is the *absolute value function*.

2 Piecewise-Defined Functions

Piecewise-Defined Functions.

A *piecewise function* is a function defined by multiple sub-functions with each sub-function applying to a certain interval of the main function's domain.

2. Evaluate the function for the given values of x and then graph the function.

$$f(x) = \begin{cases} -x - 1 & \text{for } x < 1 \\ -3 & \text{for } 1 \leq x < 2 \\ \sqrt{x - 2} & \text{for } x \geq 2 \end{cases}$$

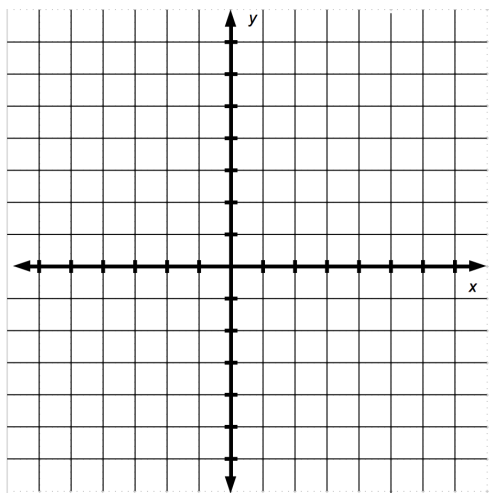
(a) $f(-3) =$

(b) $f(1) =$

(c) $f(2) =$

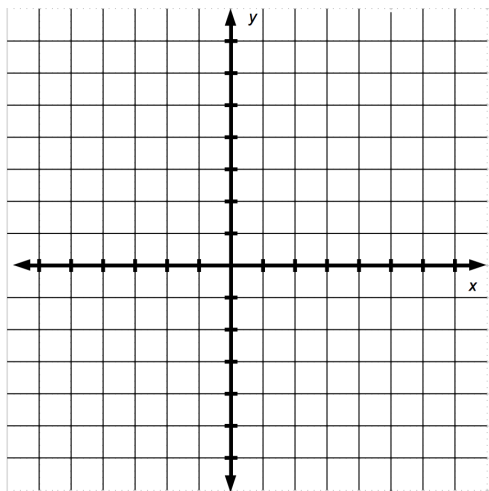
(d) $f(6) =$

(e) Graph $f(x)$



3. Graph the piecewise function.

$$f(x) = \begin{cases} x + 3 & \text{for } x < -1 \\ x^2 & \text{for } -1 \leq x < 2 \end{cases}$$

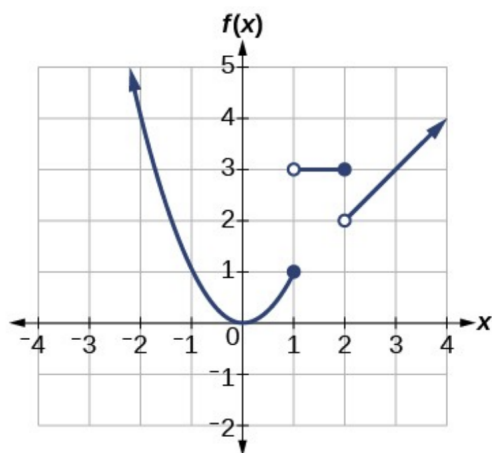


3 Intervals of Increasing, Decreasing, and Constant Behavior

When looking at functions on a graph, we read from left to right. And when we talk about function values, we mean values on the y -axis.

In this section, we will determine intervals on the x -axis where the function values on the y -axis are increasing, decreasing, or constant.

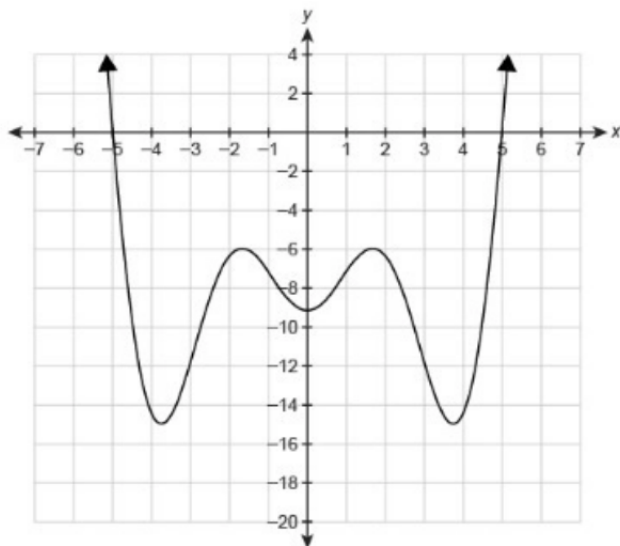
4. Determine where the following function is increasing, decreasing, or constant.



4 Relative Minimum and Relative Maximum Values

Remember, when talking about function **values**, we mean y -values. So in this section we will determine the relative minimum and maximum y -values of a function.

5. For the graph of $y = f(x)$ shown.



- (a) Determine the location and value of any relative maxima.
- (b) Determine the location and value of any relative minima.

Student Learning Outcomes Check

1. Can you determine whether a function is even, odd, or neither?
2. Can you graph a piecewise function?
3. Are you able to determine where a function is increasing, decreasing, or constant?
4. Can you locate relative minimum and relative maximum values of a function on a graph?

If any of your answers were no, please ask about these topics in class.