

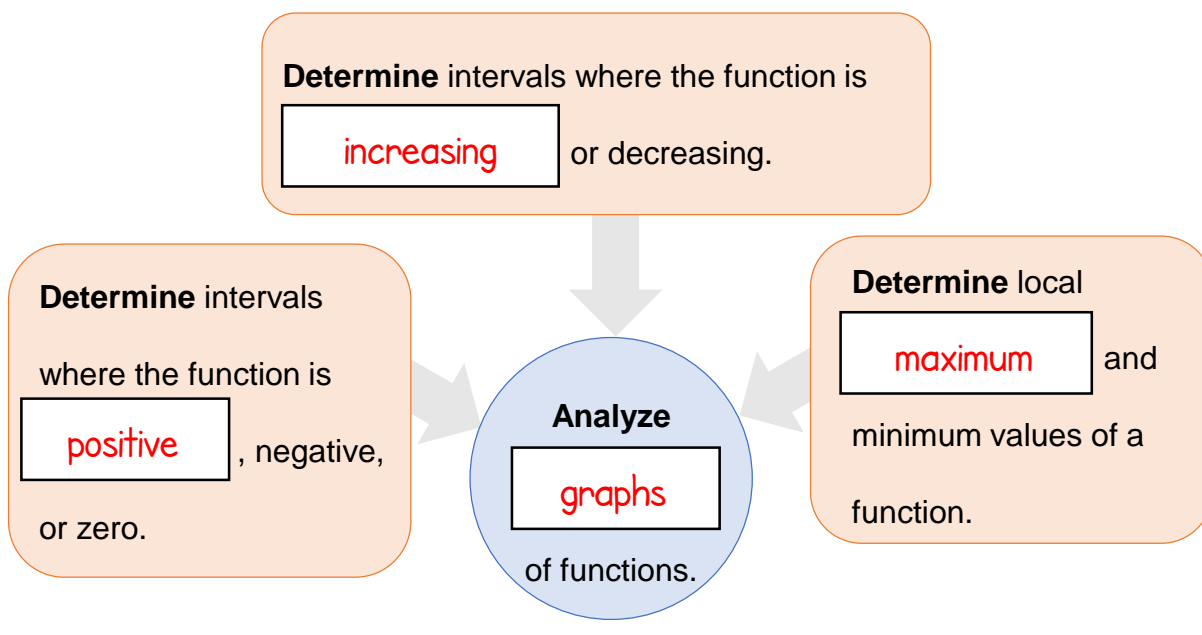
Warm-Up | Analyzing Graphs



Lesson Question

What can you tell about a functional relationship from its graph?

Lesson Goals



Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

x-intercept	the point on a graph at which the graph crosses the x -axis
local minimum	smallest function value over a specific interval of the domain
local maximum	largest function value over a specific interval of the domain

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2K**Words to Know**

Fill in this table as you work through the lesson. You may also use the glossary to help you.

end behavior	a function's behavior as the input values increase to positive infinity or decrease to negative infinity
interval	all the values found between two given endpoints
y-intercept	the point on a graph at which the graph crosses the y-axis

**Using Graphs to Find Function Input and Output Values**

Use the graph of $g(x)$ to find the indicated function's values.

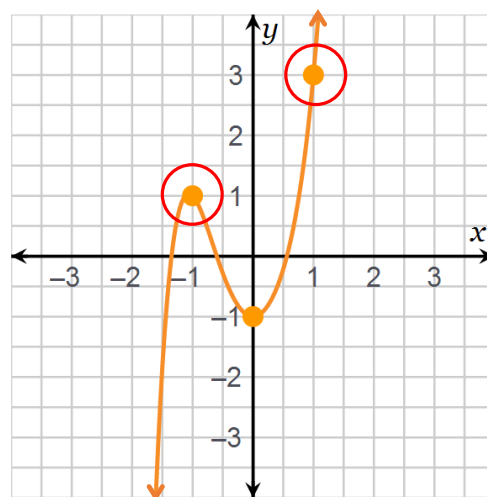
Circle the point with an input of -1 .

$$g(-1) = \boxed{1}$$

Circle the point with an output of 3 .

$$g(-1) = 3$$

$$x = \boxed{1}$$



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Intercepts of a Graph

Example: Analyze the function's graph and determine its intercepts, if any.

intersections of the axes

x-intercept(s)

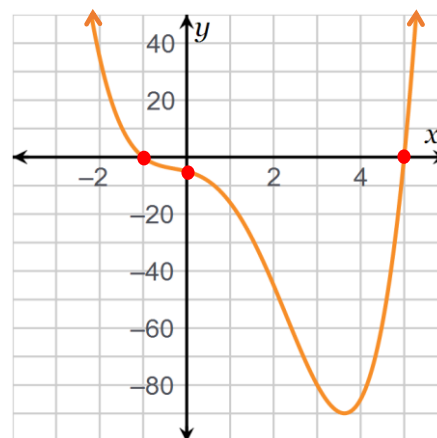
Draw a point at each x-intercept.

$(-1, 0), (5, 0)$

y-intercept

Draw a point at the y-intercept.

$(0, -5)$



Important Features of Graphs

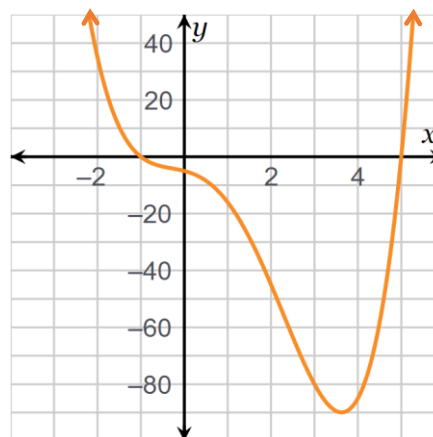
Analyze the function's graph and determine the **intervals** where the graph is positive or negative.

$f(x) > 0$

$(-\infty, -1) \cup (5, \infty)$

$f(x) < 0$

$(-1, 5)$



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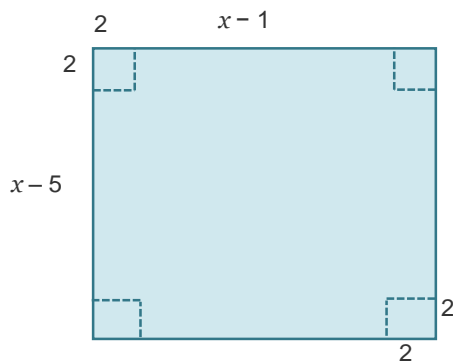
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Analyzing Graphs in Context

REAL-WORLD CONNECTION

Lorena is making a storage container from a piece of cardboard with side lengths $(x + 3)$ and $(x - 1)$. She is going to cut 2 in. from each corner to be folded up for storage. The equation that represents the volume of the container is

$$V(x) = (x - 1)(x - 5)(2).$$



The input represents:

x is used to determine the length and the **width** of our box.

The output represents:

$V(x)$ represents the **volume** of our box.

UNDERSTANDING THE GRAPH

Consider the graph that represents the volume of Lorena's container.

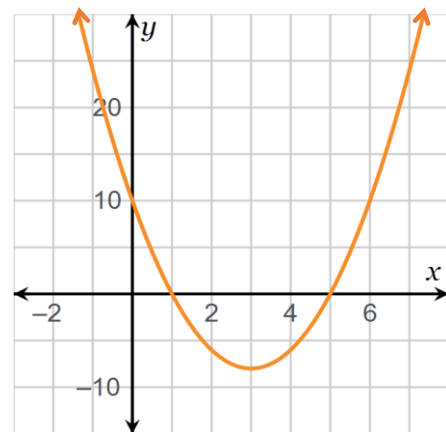
What do the intercepts mean in terms of the context?

$$x\text{-int.: } (\boxed{1} , 0), (\boxed{5} , 0)$$

$$y\text{-int.: } (0, \boxed{10})$$

What is an appropriate domain for the given function?

$$(\boxed{5} , \infty)$$



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Analyzing a Function's End Behavior

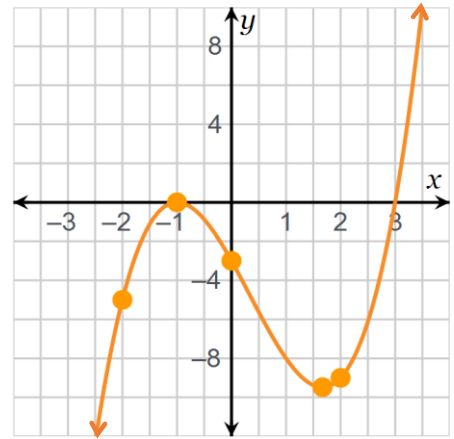
Analyze the graph to determine the **end behavior**.

- As x goes to $+\infty$, the function's

values go to ∞ .

- As x goes to $-\infty$, the function's

values go to $-\infty$.



Determining When a Function is Increasing or Decreasing

Analyze the graph to determine the intervals of decreasing and increasing function values.

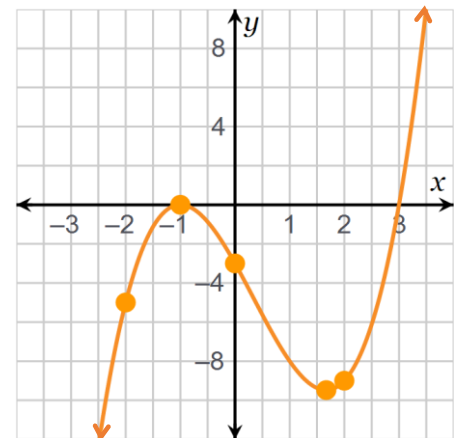
For what x -values are the function's values increasing?

$$\left(-\infty, -1\right) \cup \left(\frac{5}{3}, \infty\right)$$

For what x -values are the function's values

decreasing ?

$$\left(-1, \frac{5}{3}\right)$$



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Calculating Local Maximum and Local Minimum Values

Use the graph to determine the **local**

minimum and **local** maximum

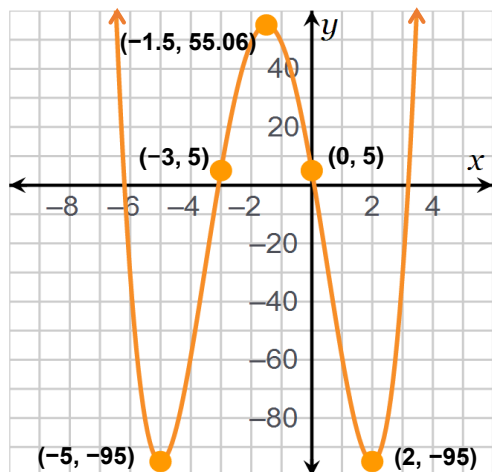
values for the function.

Local minimum:

(-5 , -95) and (2 , -95)

Local maximum:

(-1.5 , 55.06)



Summary

Analyzing Graphs

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Lesson
Question

What can you tell about a functional relationship from its graph?

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Answer

(Sample answer) When you zoom in on a graph, you can find key features of the graph, such as intercepts and end behavior, as well as local maximum and local minimum values.

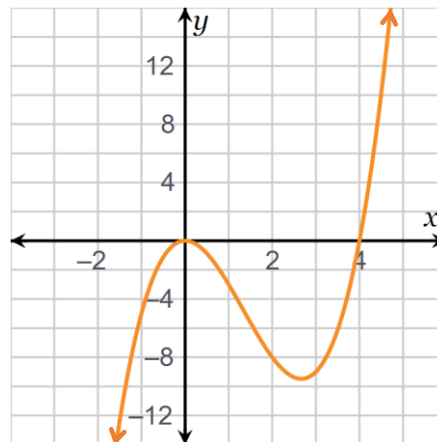
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Review: Key Concepts

Key features of a function's graph allow for a detailed analysis of the represented relationship.

- Intercepts indicate where the graph crosses the **axes**.
- Positive and negative function values indicate location relative to the **x**-axis.
- Local maximums and **local minimums** indicate where a function changes from increasing to decreasing or vice versa.





Summary

Analyzing Graphs

Use this space to write any questions or thoughts about this lesson.