

Precalculus Honors

# Functions & Graphs

## A Calculus Perspective



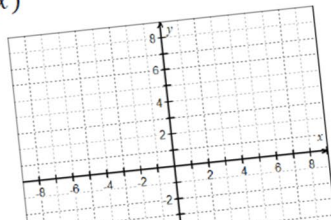
Date \_\_\_\_\_ Period \_\_\_\_\_

**Warm-Up # 1**

**Lesson 1.6: Graph Transformations**

1. Describe the transformation from the parent function  $f(x) = (x + 1)^2 - 3$

2. Graph the function  $f(x)$



3. State the domain and range of the graph of  $f(x)$ .

4. Write an equation  $g(x)$ , for the shape of  $y = x^4$  but moved one unit right and up two units and reflect over the  $y$ -axis.

# Warm-Ups

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# PRECALCULUS CURRICULUM

## Scope and Sequence

### Unit I: Functions and Graphs - A Calculus Perspective

| Lesson                           | Skills & Learning Objectives                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [1.1]<br>Function Basics         | <ul style="list-style-type: none"><li>Find the domain and range of a relation</li><li>Determine whether a relation is a function</li><li>Find the domain of a function</li><li>Evaluate a function using both explicit and implicit forms of a function</li></ul>                                                                                                         |
| [1.2]<br>Graphs of Functions     | <ul style="list-style-type: none"><li>Use the vertical line test to identify functions</li><li>Identify intervals of increase, decrease, or constant</li><li>Use graphs to locate relative extrema</li><li>Determine boundedness of a function</li><li>Identify even or odd functions and recognize their symmetries</li><li>Concavity and points of inflection</li></ul> |
| [1.3]<br>Properties of Functions | <ul style="list-style-type: none"><li>Determine continuity of functions</li><li>Identify asymptotes of functions</li><li>Find end behavior, use limits notation</li><li>Find a function's average rate of change</li><li>Compare two functions using multiple representations</li></ul>                                                                                   |
| [1.4]<br>Piecewise Functions     | <ul style="list-style-type: none"><li>Graph piece-wise and absolute value functions</li><li>Evaluate piecewise functions</li></ul>                                                                                                                                                                                                                                        |
| [1.5]<br>Parent Functions        | <ul style="list-style-type: none"><li>Recognize 18 basic parent functions</li><li>Analyze properties of functions</li><li>Associate characteristics of functions</li><li>Use Limit Notation to describe end-behavior</li></ul>                                                                                                                                            |

# Scope and Sequence

## Unit I: Functions and Graphs - A Calculus Perspective

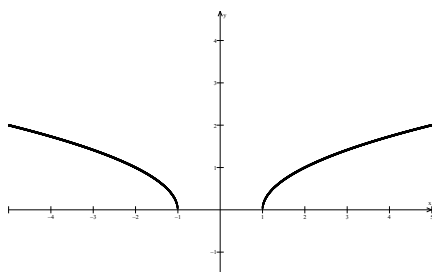
| Lesson                                | Skills & Learning Objectives                                                                                                                                                                                                                                                                                                     |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [1.6]<br>Transformations of Functions | <ul style="list-style-type: none"><li>▪ Graph functions using horizontal and vertical shifts</li><li>▪ Graph functions using compressions and stretches</li><li>▪ Graph functions using reflections about the x-axis or y-axis</li><li>▪ Graph transformations using tables and formulas</li></ul>                               |
| [1.7]<br>Combinations of Functions    | <ul style="list-style-type: none"><li>▪ Perform operations on functions</li><li>▪ Find a composition of one function with another function</li><li>▪ Model and solve real-world application problems</li></ul>                                                                                                                   |
| [1.8]<br>Functions and Their Inverses | <ul style="list-style-type: none"><li>▪ Verify two functions are inverses algebraically and graphically</li><li>▪ Use the Horizontal Line Test to determine if functions are one-to-one</li><li>▪ Use function notation to describe real-world scenarios</li><li>▪ Find inverse functions informally and algebraically</li></ul> |
| [1.9]<br>Modeling With Functions      | <ul style="list-style-type: none"><li>▪ Perform operations on functions</li><li>▪ Find a composition of one function with another function</li><li>▪ Model and solve real-world application problems</li><li>▪ Analyze data from regression formulas</li></ul>                                                                   |

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## Lesson I.2: Graphs of Functions

## Warm-Up # 1

1. Find the domain and range of  $f$ .



2. Determine the intervals over which the function from #1 is increasing, decreasing, or constant.

3. Using a graphing utility, approximate the maximum/minimum of the function.

$$g(x) = x^3 + x^2 - 3x$$

4. Determine if the function is even, odd, or neither.

$$f(x) = 4x^3 - 2x$$

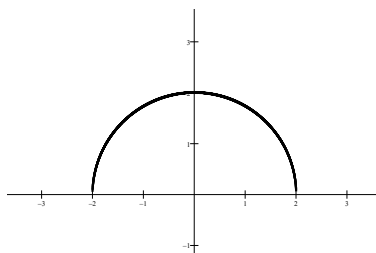
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## Lesson I.2: Graphs of Functions

## Warm-Up # 2

1. Find the domain and range of  $f$ .



2. Determine the intervals over which the function from #1 is increasing, decreasing, or constant.

3. Using a graphing utility, approximate the maximum/minimum of the function.

$$g(h) = 2h - 3$$

4. Determine if the function is even, odd, or neither.

$$y = \frac{3}{x^2 + 5}$$

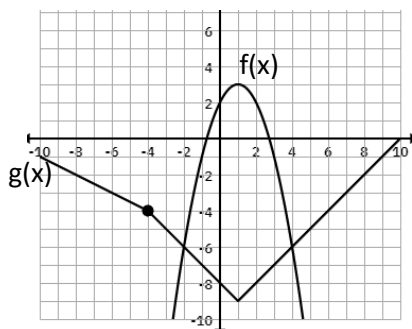
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## Lesson I.7: Combination of Functions

## Warm-Up # 1

1. What are the values of  $x$  such that  $f(x) = g(x)$



2.  $f(g(8))$

3.  $\frac{3(g(8)) + f(2)}{f(g(6))}$

4. If  $h(x) = |x + 1| - 3$ , for what value(s) of  $x$  is  $h(x) = g(f(2))$ ?

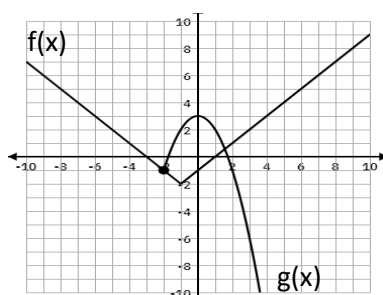
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## Lesson I.7: Combination of Functions

## Warm-Up # 2

1. What are the values of  $x$  such that  $f(x) = g(x)$



2.  $f(g(-2))$

3.  $\frac{3(g(-1)) + f(3)}{f(g(6))}$

4. If  $h(x) = |x + 1| - 3$ , for what value(s) of  $x$  is  $h(x) = g(f(0))$ ?

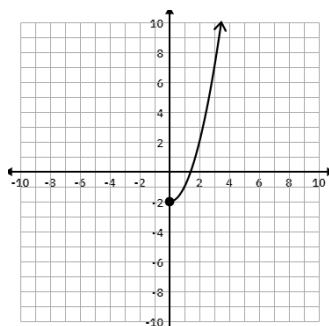
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## Lesson I.8: Relations and their Inverses

## Warm-Up # 1

1. Sketch the inverse of the function  $f$ , shown on the graph.



3. Find the inverse of  $f$ , algebraically.

4. State the domain of  $f$  and  $f^{-1}$ .

2. Write an equation for the function  $f$ .

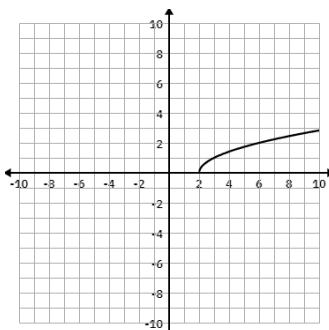
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## Lesson I.8: Relations and their Inverses

## Warm-Up # 2

1. Sketch the inverse of the function  $f$ , shown on the graph.



3. Find the inverse of  $f$ , algebraically.

4. State the domain of  $f$  and  $f^{-1}$ .

2. Write an equation for the function  $f$ .

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