# Objectives

1. Find the domain of a function
2. Find the range of a function

# Intro

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**Domain**

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## Domain

The **domain** of a function is the set of all possible legal input values ($x$) of the function.

## Range

The **range** of a function is the set of all possible output values ($y$) from the domain.

# Domain Restrictions

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- You are not allowed to divide by 0
- You can't take the square root (or any even root such as $\sqrt[4]{}$, $\sqrt[6]{}$, ...) of a negative number.

Both of the above issues will result in an error message from your calculator, and we would like to avoid those.

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Those domains are all real numbers, or $\mathbb{R}$.

# Example 1

State the domain of each.

(a) $f(x) = -2x + 7$

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$\mathbb{R}$

# Example 1

(c) $f(x) = \sqrt{x-3}$

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(d) $f(x) = \sqrt[3]{x-3}$

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$$x - 3 \geq 0$$

$$x \geq 3$$

(d) $f(x) = \sqrt[3]{x-3}$

$\mathbb{R}$

# Example 1

(e) $f(x) = \dfrac{3}{2x+5}$

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$$2x + 5 \neq 0$$

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(e) $f(x) = \dfrac{3}{2x+5}$

$$2x + 5 \neq 0$$

$$2x \neq -5$$

$$x \neq -\frac{5}{2}$$

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When we look at finding the inverse of a function, we'll learn a way to find the range of a given function.

For now, we can look at the graphs of functions to assist us in finding the range.

# Example 2

State the range of each.

(a) $f(x) = -2x + 7$

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(a) $f(x) = -2x + 7$

All real numbers, $\mathbb{R}$

# Example 2

(b) $f(x) = (x + 4)^2$

# Example 2

(b) $f(x) = (x + 4)^2$

$y \geq 0$

# Example 2

(c) $f(x) = \sqrt{x-3}$

# Example 2

(c) $f(x) = \sqrt{x-3}$

$y \geq 0$

# Example 2

(d) $f(x) = -\sqrt{x-3}$

# Example 2

(d) $f(x) = -\sqrt{x-3}$

$y \leq 0$

# Example 2

(e) $f(x) = \sqrt{x-3} + 6$

# Example 2

(e) $f(x) = \sqrt{x-3} + 6$

$y \geq 6$

# Example 2

(f) $f(x) = \dfrac{3}{2x+5}$

# Example 2

(f) $f(x) = \dfrac{3}{2x+5}$

$y \neq 0$