

College Algebra & Trigonometry I

2.4 - More on Slope

Math 1100

April 2, 2007



1 Parallel and Perpendicular Lines

- Parallel Lines
- Perpendicular Lines

2 Slope as Rate of Change

- Rate of Change
- Average Rate of Change



Slope and Parallel Lines

- If two nonvertical lines are parallel, they have the same slope.



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- If two distinct nonvertical lines have the same slope, they are parallel.



Slope and Parallel Lines

- If two nonvertical lines are parallel, they have the same slope.
- If two distinct nonvertical lines have the same slope, they are parallel.
- Two distinct vertical lines are parallel.



Example

Example Write an equation of the line passing through $(-3, 1)$ and parallel to line whose equation is $y = 2x + 1$. Express the equation in **point-slope form** and **slope-intercept form**.



Answer

- point-slope form:

$$y - 1 = 2(x - (-3)) \quad \text{since the slope } m \text{ is } 2$$

$$y - 1 = 2(x + 3)$$



Answer

- point-slope form:

$$y - 1 = 2(x - (-3)) \quad \text{since the slope } m \text{ is } 2$$

$$y - 1 = 2(x + 3)$$

- slope-intercept form:

$$y - 1 = 2(x + 3) \quad (\text{point-slope form})$$

$$y = 2x + 6 + 1$$

$$y = 2x + 7$$



Slope and Perpendicular Lines

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Slope and Perpendicular Lines

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Slope and Perpendicular Lines

- If two nonvertical lines are perpendicular, then the product of their slopes is -1 .
- If the product of two slopes is -1 , then the lines are perpendicular.
- A horizontal line and a vertical line are perpendicular.



Example

Example Write the equation of the line passing through $(2, -5)$ and perpendicular to the line whose equation is $x + 5y - 9 = 0$. Write the equation in **general form**.



Answer

- The slope for equation $x + 5y - 9 = 0$ is $-1/5$



Answer

- The slope for equation $x + 5y - 9 = 0$ is $-1/5$
- So the slope of the perpendicular line has to be 5.



Answer

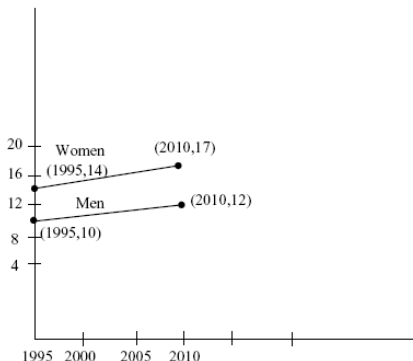
- The slope for equation $x + 5y - 9 = 0$ is $-1/5$
- So the slope of the perpendicular line has to be 5.
- point-slope form:

$$\begin{aligned}y - (-5) &= 5(x - 2) \\y + 5 &= 5x - 10 \\y - 5x + 15 &= 0\end{aligned}$$



Slope as Rate of Change: Example

The line graph represents the number of men and women living alone. Find the slope of the line segment for women and describe what this slope represents (see *textbook page 234, Example 3*).

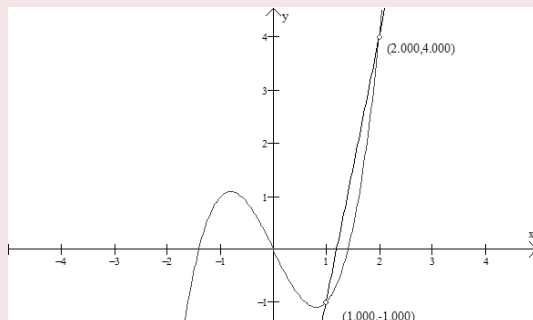


Slope and Average Rate of Change

Definition

Let $(x_1, f(x_1))$ and $(x_2, f(x_2))$ be two distinct points on the graph of a function f . The **average rate of change of f from x_1 to x_2** is

$$AVGRate = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$



Example

Example Find the average rate of change of $f(x) = x^2$ from

- $x_1 = 0$ to $x_2 = 1$
- $x_1 = 0$ to $x_2 = 2$
- $x_1 = -1$ to $x_2 = 1$

