

COLLEGE ALGEBRA

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GPS #3

1.3

LINEAR FUNCTIONS

Class Time: 11:30 Date: 1-10-08

Useful Guidelines:

- * Linear Function: $f(x) = ax + b$ [If $f(x) = b$ (constant function) and if $f(x) = x$ (Identity Function)]
Its graph is a straight line. For each unit increase in x , $f(x)$ changes by an amount equal to a .
- * Rate of Change for a Linear Function (slope of the graph): The output of a linear function changes by a constant amount for each unit increase in the input.
- * When data have a constant rate of change, they can be modeled by $f(x) = ax + b$. The constant a represents the rate of change, and the constant b represents the initial amount or the value when $x = 0$.
- * The slope of a line through the points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}} \quad (x_1 \neq x_2). \quad \text{"Slope Formula"}$$

1. Determine whether f is a linear function. If f is linear, give values for a and b so that f may be expressed as $f(x) = ax + b$. $a = -3$ $b = -2$

a) $f(x) = -3x - 2$

b) $f(x) = x^2 - 2$ *not linear its a parabola*

c) $f(x) = \frac{x(8)}{x(3)} - \frac{4x+2}{3x}$

$$8x - (4x+2) = \frac{-4x}{3x} - \frac{2}{3x}$$

$$= -\frac{4}{3}x - \frac{2}{3x} - 1$$

not linear

d) $f(x) = \sqrt{x} + 4$ $x^{1/2} + 4$ *not linear*

2. a) Find the slope, if it exists, of the line passing through the points $(1, 9)$ and $(8, 18)$.

$$m = \frac{18 - 9}{8 - 1} = \frac{9}{7}$$

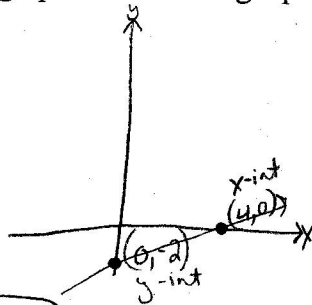
b) If a linear function has the points $(1, 9)$ and $(8, 18)$ on its graph, what is the rate of change of the function?

$$\frac{\Delta y}{\Delta x} = \text{rate of change} = \frac{9}{7}$$

3. Use the intercepts to graph the following equations.

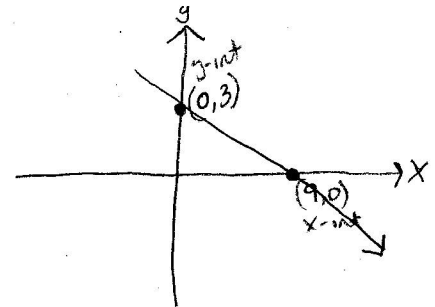
a) $2y - x = -4$

x	y
0	-2
4	0



b) $x + 3y = 9$

x	y
0	3
9	0



4. Suppose the monthly cost for the manufacture of tennis balls is $C(x) = 1220 + 0.21x$, where x is the number of tennis balls produced each month.

a) What is the slope of the graph of the total cost function?

$\$0.21$ per tennis ball

b) What is the marginal cost (rate of change of the cost function) for the product?

$\$0.21$

c) What is the cost of each additional ball that is produced in a month?

$\$0.21$