

# COLLEGE ALGEBRA

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GPS #5 1.5 ALGEBRAIC AND GRAPHICAL SOLUTIONS OF LINEAR EQUATIONS

Class Time: 11:30-12:45 Date: 1-15-08

## Useful Guidelines:

To solve a Linear Equation in One Variable:

- \* Eliminate the fractions: Multiply both sides by the least common denominator as needed.
- \* Clear parentheses and combine like terms as needed.
- \* Get all terms with the variable on one side of the equation and all numbers on the other side.
- \* Get an equation with just the variable on one side of the equation.

*no good*

**Zero of a Function:** Any number  $a$ , for which  $f(a) = 0$ , is called a zero of the function  $f(x)$ . If  $a$  is real,  $a$  is an  $x$ -intercept of the graph of the function. [Zeros of the function: solutions to the equation  $f(x) = 0$ .]

Solve the following linear equations in one variable:

1. a)  $\frac{4x+3}{4} - \frac{x-1}{2} = 5$  LCD=4

$$4 \left[ \frac{4x+3}{4} - \frac{x-1}{2} \right] = [5] \cdot 4$$

$$= (4x+3) - 2(x-1) = 20$$

$$= 4x+3-2x+2=20$$

$$2x+5=20$$

$$2x=15$$

$$x = \frac{15}{2}$$

b)  $\frac{3}{4}x - \frac{2}{7} = \frac{5}{7}x + \frac{1}{2}$  LCD=28

$$28 \left[ \frac{3}{4}x - \frac{2}{7} \right] = \left[ \frac{5}{7}x + \frac{1}{2} \right] \cdot 28$$

$$21x - 8 = 20x + 14$$

$$21x - 20x = 20 + 8$$

$$x = 28$$

2. a)  $0.04z + 0.02(z-5) = 0.01z + 0.25$  LCD=100

$$100 \left[ \frac{4}{100}z + \frac{2}{100}(z-5) \right] = \left[ \frac{1}{100}z + \frac{25}{100} \right] \cdot 100$$

$$4z + 2(z-5) = z + 25$$

$$4z + 2z - 10 = z + 25$$

$$6z - 10 = z + 25$$

$$5z = 35$$

$$z = 7$$

b)  $1.39 - 0.15x = 2.41x + 0.11$  LCD=100

$$139 - 15x = 241x + 11$$

$$-15x - 241x = 11 - 139$$

$$-256x = -128$$

$$x = \frac{-128}{-256} = \frac{1}{2}$$

3. For the function  $f(x) = 45 + 15x$ , find:

a)  $f(-3)$

$$f(-3) = 45 + 15(-3)$$

$$45 - 45 = 0$$

$$f(-3) = 0$$

c) The  $x$ -intercept of the graph of  $f(x) = 45 + 15x$

$$0 = 45 + 15x$$

$$-15x = 45$$

$$x = \frac{45}{-15} = -3$$

b) The solution to the equation  $f(x) = 0$

$$45 + 15x = 0$$

$$-15x = -45$$

$$x = \frac{-45}{-15} = 3$$

d) The zero of  $f(x) = 45 + 15x$ .

$$0 = 45 + 15x$$

$$-15x = 45$$

$$x = \frac{45}{-15} = -3$$

4. The future value of a simple interest investment is given by  $S = P(1+rt)$ . What principal  $P$  must be invested for twenty years at the simple interest rate of 5% so that the future value grows to \$300,000?

$$300,000 = P(1 + .05(20))$$

$$300,000 = P(1 + 1)$$

$$\frac{300,000}{2} = \frac{2P}{2}$$

$$P = 150,000$$

$$S = 300,000$$

$$P = P$$

$$r = .05(5\%)$$

$$t = 20 \text{ yrs.}$$