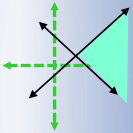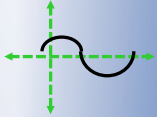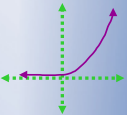$5x-2y \leq 75$

$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$S = Pe^{rt}$

$APY = (1+\frac{r}{n})^{n}-1$

Math 1090 ~ Business Algebra

Section 1.2 Linear Inequalities in One Variable

Objectives:
- Solve and simplify linear inequalities.
- Graph linear inequalities.
- Translate a word problem into a linear inequality.

A Linear Inequality can be written in the form $ax + b \leq c$ where *a,b* and *c* are constants and $a \neq 0$.

A linear inequality is solved much like a linear equation.

If we multiply or divide by a negative number, the inequality sign must be switched.

Ex 1: Solve and graph the solution for each of these.

a) $\frac{3}{2}x + 3 \leq -6$

$\qquad -3 \quad -3$

$\frac{2}{3} \cdot \frac{3}{2}x \leq -9 \cdot \frac{2}{3}$ (with -3 above)

$x \leq -6$

b) $\frac{5x+3}{8} - 1 > \frac{x+4}{6} + 1$

$\qquad +1 \qquad +1$

$24\left(\frac{5x+3}{8}\right) > \left(\frac{x+4}{6} + 2\right)24$

$3(5x+3) > \frac{(x+4)24^4}{6} + 2(24)$

$15x + 9 > 4x + 16 + 48$

$15x + 9 > 4x + 64$

$11x + 9 > 64$

$11x > 55$

$x > 5$

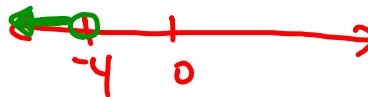Ex 2:   Solve and graph the solution.

$5 - 3x > 17$

$\quad -5 \qquad -5$

$$\frac{-3x}{-3} > \frac{12}{-3}$$

$x < -4$

test a pt:
$x = -100$

$5 - 3(-100) = 5 + 300 > 17$ ✓

$\quad -4 \quad 0$

Ex 3: Translate to a compound inequality.

Three times a number is less than 13 and greater than -3.

$$-3 < 3x < 13$$

Ex 4: An investor wants to invest a total of $10,000 in two different accounts. The riskier investment yields an annual average of 9.5% profit and the safer investment has an annual average yield of 4.5%. How much money should be invested in the riskier account in order to earn at least $600 profit in a year?

$x =$ $ invested in riskier acct.

$\Rightarrow$ $10000 - x =$ $ invested in safer acct.

want at least $600 profit

$$\underbrace{0.095x}_{\substack{\text{profit} \\ \text{from} \\ \text{risky acct.}}} + \underbrace{0.045(10000-x)}_{\substack{\text{profit from} \\ \text{safe} \\ \text{acct.}}} \geq \underbrace{600}_{\substack{\text{desired} \\ \text{profit}}}$$

$$0.095x + 450 - 0.045x \geq 600$$

$$0.05x + 450 \geq 600$$

$$\frac{0.05x}{0.05} \geq \frac{150}{0.05} \quad \left(\frac{100}{100}\right)$$

$$x \geq \frac{15000}{5}$$

$$x \geq \$3000$$

$\Rightarrow$ we must invest at least $3000 in riskier acct. to get desired profit.

Ex 5: A product sells for $20 and has a unit cost of $15, and fixed costs of $200,000. Find the least number of products that must be sold to have a profit.

$$P = R - C \quad (Profit = Revenue - Cost)$$

$$R = 20x \qquad x = \# \text{ of products produced}$$
$$\& \text{ Sold}$$

$$C = 15x + 200,000$$

want $\quad P \geq 0$

$$P = 20x - (15x + 200000)$$

$$P = 20x - 15x - 200000$$
$$P = 5x - 200000$$

$$5x - 200000 \geq 0$$

$$5x \geq 200000$$

$$x \geq 40,000$$

$\Rightarrow$ we need to produce and sell at least 40,000 products to make a profit