

Do your own work. There are up to 10 Bonus Points available. So choose the 10 points you want to try for and write the word OMIT next to all the ones you don't.

1. (5 pts) Solve the absolute value equation  $|3x - 4| = 7$ .

$$3x - 4 = 7 \quad \text{OR} \quad 3x - 4 = -7$$

$$3x = 11 \quad \text{OR} \quad 3x = -3$$

$$x = \frac{11}{3} \quad \text{OR} \quad x = -1$$

**Bonus** (5 pts) What is the solution set for #1?

$$x \in \left\{ -1, \frac{11}{3} \right\}$$

2. Solve the absolute value inequalities. Express your answer in set-builder notation and interval notation.

a. (5 pts)  $|3x - 4| > 7$

$$3x - 4 > 7 \quad \text{OR} \quad 3x - 4 < -7$$

$$3x > 11 \quad \text{OR} \quad 3x < -3$$

$$\left\{ x \mid x > \frac{11}{3} \quad \text{OR} \quad x < -1 \right\}$$

$$= (-\infty, -1) \cup \left( \frac{11}{3}, \infty \right)$$

b. (5 pts)  $|3x - 4| < 7$

$$3x - 4 < 7 \quad \text{AND} \quad 3x - 4 > -7$$

$$3x < 11 \quad \text{AND} \quad 3x > -3$$

$$\left\{ x \mid x < \frac{11}{3} \quad \text{AND} \quad x > -1 \right\}$$

$$= \left( -1, \frac{11}{3} \right)$$

3. Solve the absolute value inequalities

a. (5 pts)  $|3x - 4| > -7$ .

$$(-\infty, \infty)$$

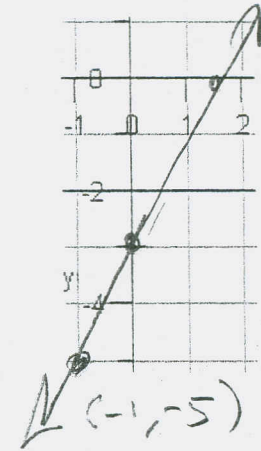
b. (5 pts)  $|3x - 4| < -7$

$$\emptyset$$

4. All graphs must include any x- or y-intercepts.

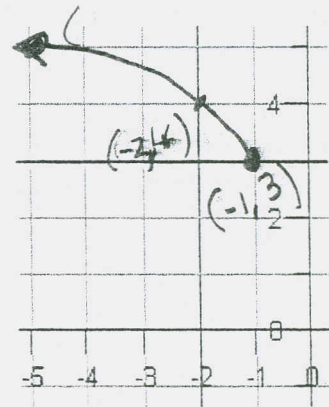
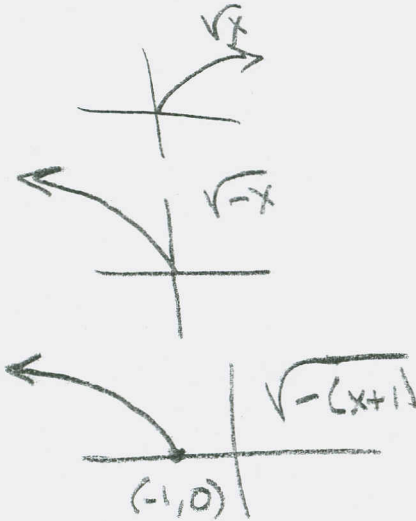
a. (5 pts) Graph the line  $y = 2x - 3$

$$2(-1) - 3 = -5$$



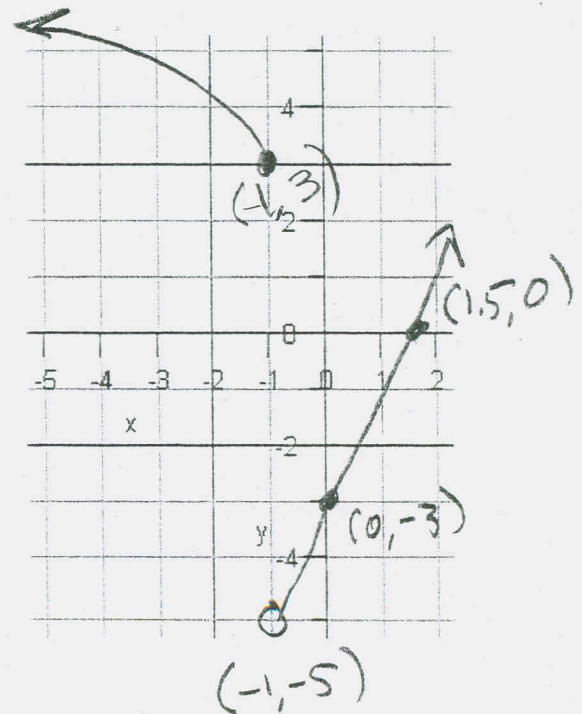
5. (5 pts) Graph the function  $g(x) = \sqrt{-x-1} + 3$

$$= \sqrt{-(x+1)} + 3$$



6. (5 pts) Graph the piecewise-defined function

$$f(x) = \begin{cases} 2x - 3 & \text{if } x > -1 \\ \sqrt{-x-1} + 3 & \text{if } x \leq -1 \end{cases}$$



7. Solve the system of equations  $\begin{cases} x - 3y = 7 \\ 2x + 3y = 5 \end{cases}$  by two methods:

a. (5 pts) Substitution

$$\begin{aligned} x &= 3y + 7 \\ 2(3y + 7) + 3y &= 5 \\ 6y + 14 + 3y &= 5 \\ 9y + 14 &= 5 \\ 9y &= -9 \\ y &= -1 \\ x &= 3(-1) + 7 \\ &= -3 + 7 \\ &= 4 = x \end{aligned}$$

b. (5 pts) Elimination

$$\begin{aligned} -2(x - 3y) &= -2(7) \\ -2x + 6y &= -14 \quad \text{E1} \\ 2x + 3y &= 5 \\ \hline 9y &= -9 \\ y &= -1 \\ x - 3y &= 7 \\ x - 3(-1) &= 7 \\ x + 3 &= 7 \\ x &= 4 \end{aligned}$$

8. (5 pts) How much 30% alcohol and 70% alcohol will it take to create 5 gallons of 52% alcohol?

Let  $x$  = amt of 30% alcohol (gallons)  
 $y$  = " " 70% " "

Then

$$\begin{aligned} x + y &= 5 \\ .3x + .7y &= .52(5) \\ .3(5 - y) + .7y &= 2.6 \\ 1.5 - .3y + .7y &= 2.6 \\ -.4y + 1.5 &= 2.6 \end{aligned}$$

$$\begin{aligned} -.4y &= 1.1 \\ y &= \frac{1.1}{-.4} = \frac{11}{4} = 2.75 = y \\ \Rightarrow x &= 5 - 2.75 = 2.25 = x \end{aligned}$$

9. (5 pts) Big Jim's Bike Rims is having a 30% Off! sale. If the price before the discount is \$40, what is the price *after* the discount?

$$\text{Let } x = \text{price after the discount (\$)}$$

$$\begin{aligned} \text{Then } x &= 40 - .3(40) \\ &= 40 - 12 \end{aligned}$$

$$= \$38$$

10. (5 pts) Find an equation for the line passing through the points (3,1) and (6, -2).

$$m = \frac{-2-1}{6-3} = \frac{-3}{3} = -1$$

$$y = m(x - x_1) + y_1 = -1(x - 3) + 1 = y$$

11. (5 pts) Find an equation of the line passing through (3, 1) that is parallel to the line with equation  $y = 3x + 7$ .

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

- Bonus (5 pts)** Find an equation of the line passing through (3, 1) that is perpendicular to the line with equation  $y = 3x + 3$ .

$$y = -\frac{1}{3}(x - 3) + 1$$

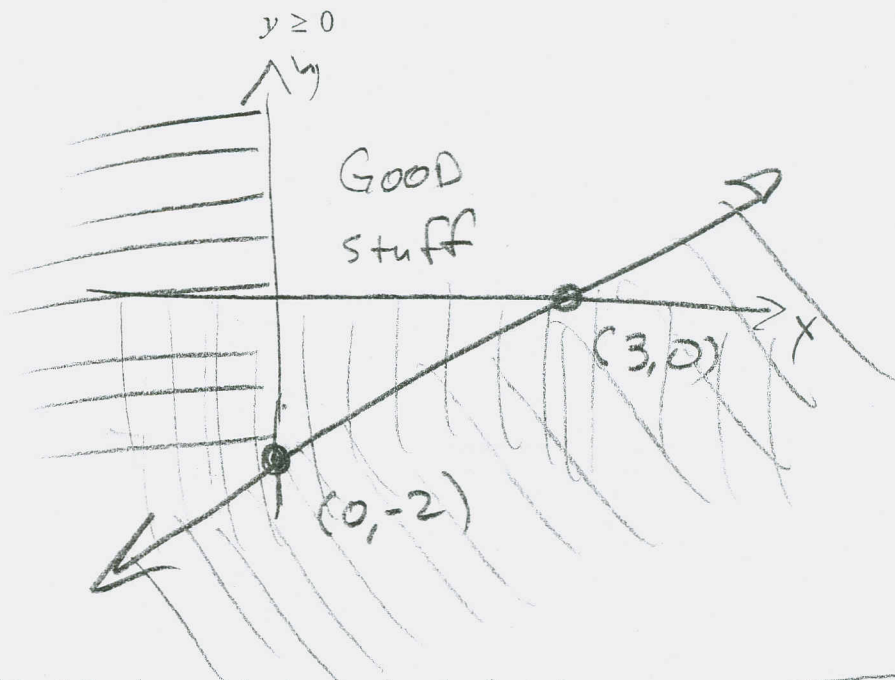
$$2x - 3y \leq 6$$

**Bonus (5 pts)** Sketch the system of inequalities  $x \geq 0$

$$2x - 3y = 6$$

x	y
0	-2
3	0

$0 \leq 6?$   
 $(0,0)$  good



**Bonus (5 pts)** Solve *one* of the following quadratic equations by factoring.

a.  $x^2 - 2x - 24 = 0 \rightarrow (x - 6)(x + 4) = 0 \Rightarrow x \in \{-4, 6\}$

b.  $9x^2 - 25 = 0 \Rightarrow (3x - 5)(3x + 5) = 0 \Rightarrow x \in \{-\frac{5}{3}, \frac{5}{3}\}$

c.  $x^2 - 6x + 9 = 0$

$$\Rightarrow (x - 3)^2 = 0$$

$$\Rightarrow x = 3$$

**Bonus (5 pts)** Find the *real* solution of the cubic equation  $8x^3 - 27 = 0$  by factoring.

$$(2x)^3 - 3^3 = (2x - 3)((2x)^2 + 6x + 3^2) = 0$$

$$\Rightarrow 2x - 3 = 0$$

$$\Rightarrow 2x = 3$$

$$\Rightarrow x = \frac{3}{2}$$