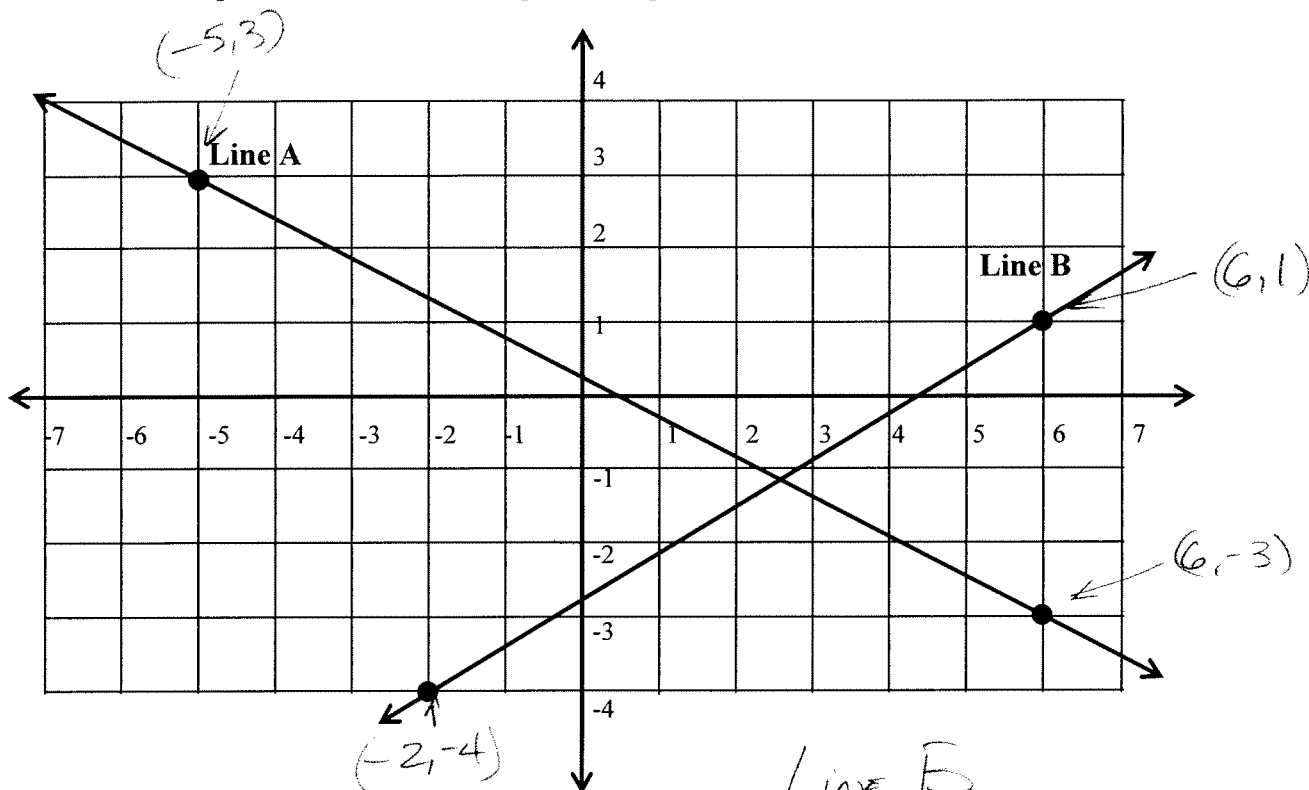


Math251

Practice Exam #02

1. Write the equation of the line in slope-intercept form.



Line A

$$m_A = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-4)}{-5 - 6} = -\frac{6}{11}$$

Using the slope & $(-5, 3)$;

$$y = mx + b$$

$$3 = -\frac{6}{11}(-5) + b$$

$$3 = \frac{30}{11} + b$$

$$11[3] = 11\left[\frac{30}{11} + b\right]$$

$$\begin{array}{r} 33 = 30 + 11b \\ -30 \quad -30 \\ \hline \end{array}$$

$$\frac{3}{11} = \frac{11b}{11}$$

$$\frac{3}{11} = b$$

Solution

$$\boxed{y = -\frac{6}{11}x + \frac{3}{11}}$$

Line B

$$m_B = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-4)}{6 - (-2)} = \frac{1+4}{6+2} = \frac{5}{8}$$

Using the slope & $(6, 1)$;

$$y = mx + b$$

$$1 = \frac{5}{8}(6) + b$$

$$1 = \frac{30}{8} + b$$

$$8[1] = 8\left[\frac{30}{8} + b\right]$$

$$\begin{array}{r} 8 = 30 + 8b \\ -30 \quad -30 \\ \hline \end{array}$$

$$-22 = 8b$$

$$-\frac{22}{8} = \frac{8b}{8}$$

$$-\frac{22}{8} = b$$

$$-\frac{11}{4} = b$$

Solution

$$\boxed{y = \frac{5}{8}x - \frac{11}{4}}$$

2. The plane travels 408 miles in 3 hours with the wind and 128 miles in 2 hours against the wind. Find the speed of the wind and the speed of the plane in still air. **Complete the table and set up an equation to solve this problem.**

	Rate	Time	Distance
With the Wind	$x+y$	3	408
Against the Wind	$x-y$	2	128

$$x = R_{\text{plane}}$$

$$y = R_{\text{wind}}$$

$$(x-y) \cdot 2 = 128$$

$$\frac{(x-y) \cdot 2}{2} = \frac{128}{2}$$

$$x-y = 64$$

$$(x+y) \cdot 3 = 408$$

$$\frac{(x+y) \cdot 3}{3} = \frac{408}{3}$$

$$x+y = 136$$

$$x+y = 136$$

$$4) x-y = 64$$

$$\frac{2x}{2} = \frac{200}{2}$$

$$x = 100 \text{ mi/hr}$$

$$x+y = 136$$

$$(-) x-y = 64$$

$$\frac{2y}{2} = \frac{72}{2}$$

$$y = 36 \text{ mi/hr}$$

3. Write the equation of the line in slope intercept form using the given information.

a) $m = -\frac{3}{2}, \left(-\frac{5}{2}, 2\right)$

$$y = mx + b$$

$$2 = \left(-\frac{3}{2}\right)\left(-\frac{5}{2}\right) + b$$

$$2 = \frac{15}{4} + b$$

$$4[2] = 4\left[\frac{15}{4} + b\right]$$

$$\begin{array}{r} 8 = 15 + 4b \\ -15 \quad -15 \\ \hline \end{array}$$

$$-7 = 4b$$

$$-\frac{7}{4} = b$$

$$y = -\frac{3}{2}x - \frac{7}{4}$$

b) $(3, -2), (-5, -3)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-2)}{-5 - 3} = \frac{-3 + 2}{-8} = \frac{-1}{-8} = \frac{1}{8}$$

Using $(3, -2)$ & $m = \frac{1}{8}$:

$$y = mx + b$$

$$-2 = \frac{1}{8}(3) + b$$

$$8[-2] = 8\left[\frac{1}{8}(3) + b\right]$$

$$-16 = 1 \cdot 3 + 8b$$

$$\begin{array}{r} -16 = 3 + 8b \\ -3 \quad -3 \\ \hline \end{array}$$

$$-\frac{19}{8} = \frac{8b}{8}$$

$$-\frac{19}{8} = b$$

$$y = \frac{1}{8}x - \frac{19}{8}$$

4. A pharmacist has in stock a 30% alcohol solution and a 80% alcohol solution. How many liters of each are required to be mixed together to get 100 liters of a 50% alcohol solution? Fill in the table, get the two equations and solve. Complete the table and set up an equation to solve this problem.

	Amount of solution	% alcohol	Amount of alcohol
Sol 1	x	0.3	$0.3x$
Sol 2	y	0.8	$0.8y$
Final	100	0.5	50

$$x + y = 100$$

$$0.3x + 0.8y = 50$$

$$10[0.3x + 0.8y] = 10[50]$$

$$3x + 8y = 500$$

$$3[x + y] = 3[100]$$

$$3x + 3y = 300$$

$$3x + 8y = 500$$

$$(-) \quad 3x + 3y = 300$$

$$5y = \frac{200}{5}$$

$$y = 40 \text{ L}$$

By inspection

$$x = 60 \text{ L}$$

Note: $x + y = 100$

5. Solve each system by elimination.

a) $x + y = 2$
 $x - 2y = 4$

Multiply top Equation by 2

$$2[x + y] = 2[2]$$

$$2x + 2y = 4$$

Top Equation $\begin{cases} 2x + 2y = 4 \\ x - 2y = 4 \end{cases}$

Bottom Equation $\begin{cases} 2x + 2y = 4 \\ x - 2y = 4 \end{cases}$

$$\frac{3x}{3} = \frac{8}{3}$$

$$x = \frac{8}{3}$$

Solution $\left(\frac{8}{3}, -\frac{2}{3}\right)$

b) $2x - 3y = 3$
 $3x + 4y = -1$

$$3[2x - 3y] = [3]3 \quad ; \quad 2[3x + 4y] = [-1]2$$

$$6x - 9y = 9 \quad ; \quad 6x + 8y = -2$$

$$6x - 9y = 9$$

$$(-) \quad 6x + 8y = -2$$

$$-17y = 11$$

$$y = -\frac{11}{17}$$

To Eliminate y , Multiply top Equation by 4.
 Multiply bottom Equation by 3.

$$4[2x - 3y] = [3]4 \quad ; \quad 3[3x + 4y] = [-1]3$$

$$8x - 12y = 12 \quad ; \quad 9x + 12y = -3$$

$$8x - 12y = 12$$

$$(+)\quad 9x + 12y = -3$$

$$\frac{17x}{17} = \frac{9}{17}$$

$$x = \frac{9}{17}$$

Solution $\left(\frac{9}{17}, -\frac{11}{17}\right)$

6. At the end of the day a cashier has a total of 103 \$1 and \$5 bills. The total value of the money is \$415. How many bills of each denomination does the cashier have?

Complete the table and set up an equation to solve this problem.

	Number of bills	Bill value	Total value
\$1's	x	1	x
\$5's	y	5	$5y$
Total	103		415

$$x + y = 103$$

$$x + 5y = 415$$

$$\begin{aligned} x + 5y &= 415 \\ (-) x + y &= 103 \end{aligned}$$

$$\frac{4y}{4} = \frac{312}{4}$$

$$y = 78 \text{ \$5's}$$

$$x + y = 103$$

$$\begin{aligned} x + 78 &= 103 \\ -78 &\quad -78 \end{aligned}$$

$$x = 25 \text{ \$1's}$$

7. Graph the inequality.

$$x + 2y = 5$$

x	y
5	0
3	1
1	2

Using (0,0)
 $0 \geq 5$
 False

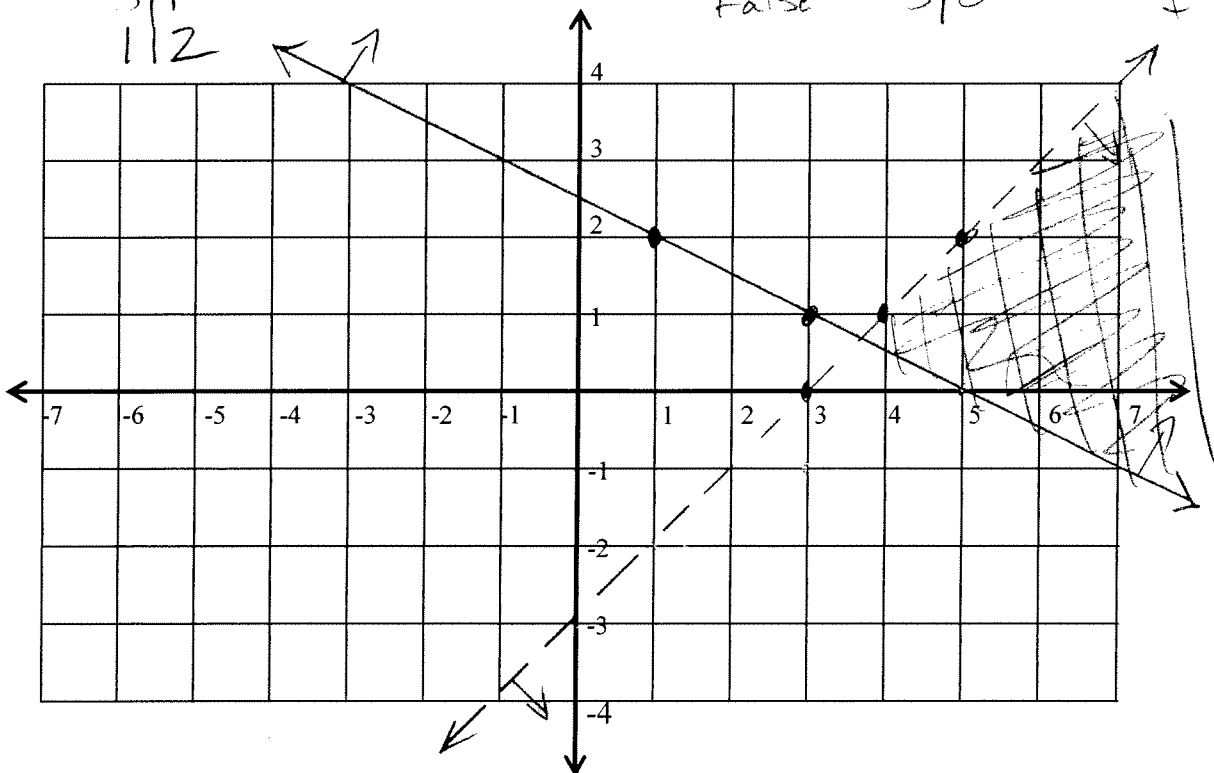
$$x + 2y \geq 5$$

$$x - y > 3$$

Using (0,0)
 $0 > 3$
 False

$$x - y = 3$$

x	y
5	2
4	1
3	0



8. Line A and Line B are two perpendicular lines that intersect at the point (3,6). Line A has equation $-2x + 3y = 12$. Find the coordinates of the y-intercept for Line B.

Line A; Solve for $y = mx + b$

$$\begin{array}{r} -2x + 3y = 12 \\ + 2x \quad + 2x \end{array}$$

$$\frac{3y}{3} = \frac{2x}{3} + \frac{12}{3}$$

$$y = \frac{2}{3}x + 4$$

Slope of Line A

$$\text{is } m_A = \frac{2}{3}$$

Since Line A & Line B are perpendicular, and $m_A = \frac{2}{3} \Rightarrow m_B = -\frac{3}{2}$

To find the equation for Line B, use (3,6) & $m_B = -\frac{3}{2}$: $y = mx + b$

$$6 = -\frac{3}{2}(3) + b$$

$$2[6] = 2[-\frac{3}{2}(3) + b]$$

$$12 = -9 + 2b$$

$$\begin{array}{r} + 9 \quad + 9 \\ \hline 21 = 2b \end{array}$$

$$\frac{21}{2} = b$$

9. A mini-mart store manager wishes to blend candy selling at \$1.20 per lb with candy that sells at \$1.50 per lb to get a mixture that will sell for \$1.35. How many pounds of the \$1.20 and the \$1.50 candies should be used to get 10 lbs of the blended candy mixture. **Complete the table and set up an equation to solve this problem.**

	Amount of candy	Cost per Pound	Total Cost
Candy 1	x	1.20	1.20x
Candy 2	y	1.50	1.50y
Blended Candy	10	1.35	13.5

$$x + y = 10$$



$$12(x + y) = 12(10)$$

$$12x + 12y = 120$$

$$1.20x + 1.50y = 13.5$$

$$10[1.20x + 1.50y] = 10[13.5]$$

$$12x + 15y = 135$$

$$12x + 15y = 135$$

$$\rightarrow 12x + 12y = 120$$

$$\frac{3y}{3} = \frac{15}{3}$$

$$y = 5 \text{ lbs of Candy 2}$$

$$\therefore x = 5 \text{ lbs of Candy 1}$$

$$\text{Note: } x + y = 10$$

Solution
(0, $\frac{21}{2}$)
y-int.

10. Solve the system of equations by graphing. Plot at least three points for each line.

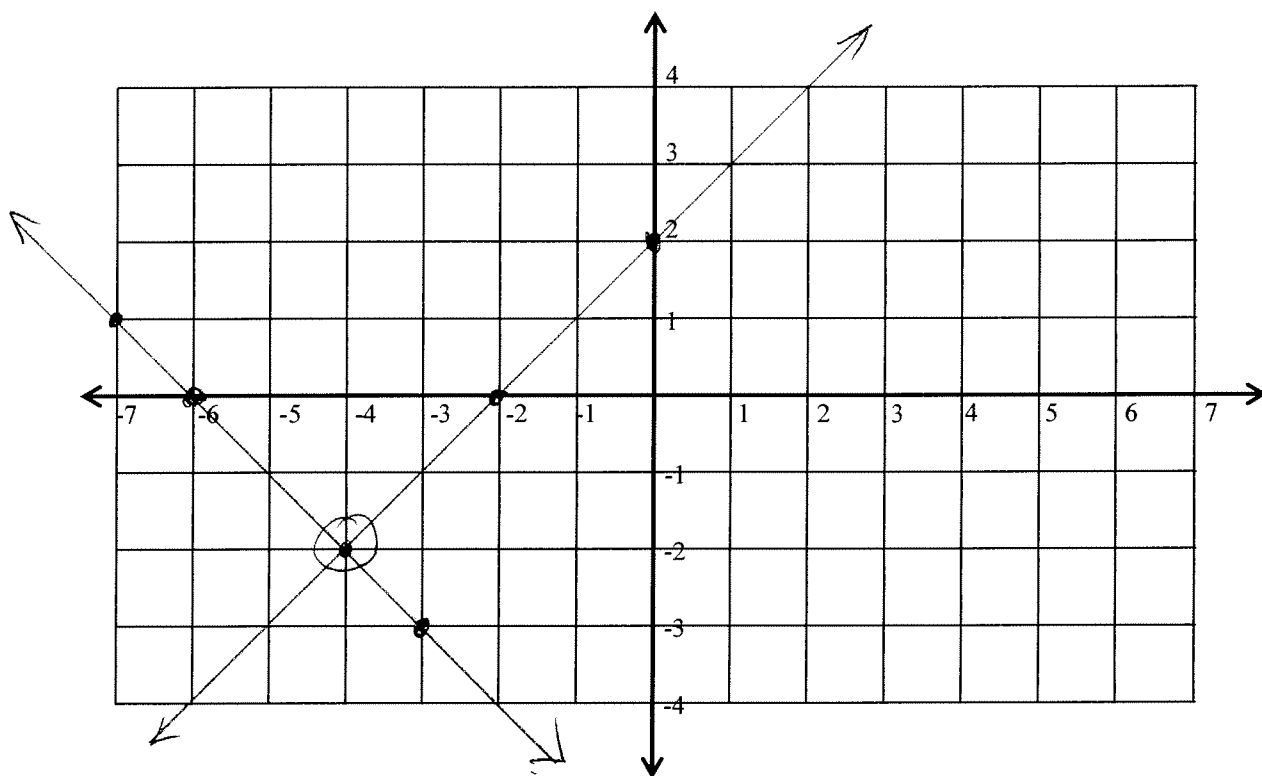
$$x - y = -2$$

$$x + y = -6$$

x	y
0	2
-2	0
-4	-2

x	y
0	-6
-6	0
-3	-3
-7	1

← This point is not on the given grid.



Solution is $(-4, -2)$.

The intersection of the two lines.