

Instructions: Complete the following problems. You may work alone or in a group. Do not just copy answers from a group member, but be sure that you understand the problem. Similar questions will appear on exams. You may be asked to explain or present the answers to the class. This assignment is due at the end of the class period.

1. If a movie theatre sells adult tickets at \$4.00 per ticket and children and senior's tickets at \$2.00 per ticket, find the number of tickets of each type sold in one night if the theatre sold 185 total tickets and made \$610.

$$\begin{aligned} 4x + 2y &= 610 \\ x + y &= 185 \\ x &= 185 - y \end{aligned}$$

$$\begin{aligned} 4(185 - y) + 2y &= 610 \\ 740 - 4y + 2y &= 610 \\ -2y &= -130 \\ \underline{-2} & \quad \underline{-2} \\ y &= 65 \end{aligned}$$

$$\begin{aligned} x &= 185 - 65 = 120 \\ 120 \text{ adult tickets} \\ 65 \text{ children \& seniors} \end{aligned}$$

2. One day you decide to buy 20 first-class stamps and 10 postcard stamps for \$11.10. Another day you spend \$47.10 on 80 first-class stamps and 50 postcard stamps. Find the cost of each type of stamp purchased.

$$\begin{aligned} 20x + 10y &= 11.10 \\ 80x + 50y &= 47.10 \\ \underline{-100x - 50y} &= \underline{-55.50} \\ -20x &= -8.4 \\ \underline{-20} & \quad \underline{-20} \\ x &= 0.42 \end{aligned}$$

$$\begin{aligned} x &= \text{first class stamps} = 0.42 \\ y &= \text{postcard stamps} = 0.27 \end{aligned}$$

$$\begin{aligned} 20(0.42) + 10y &= 11.10 \\ 10y &= 2.7 \\ y &= 0.27 \end{aligned}$$

3. A lab technician needs 60 ml of a 50% saline solution. How many ml of a 30% solution should be added to a 60% saline solution to obtain the required mixture?

$$y = 60 - x$$

$$\begin{aligned} x + y &= 60 \\ .6x + .3y &= 60(.5) = 30 \\ .6x + .3(60 - x) &= 30 \\ .6x + 18 - .3x &= 30 \\ .3x &= 12 \Rightarrow \boxed{x = 40 \quad y = 20} \end{aligned}$$

4. Redo the above problem if pure water is added (0% saline) instead of the 30% solution.

$$\begin{aligned} x + y &= 60 \\ .6x + 0y &= 30 \\ \underline{\cdot 6} & \quad \underline{\cdot 6} \\ \boxed{x = 50} \\ \boxed{y = 10} \end{aligned}$$

5. On the attached graph paper, draw the systems of linear inequalities. Find and label any corner points of the region.

a. $\begin{cases} x > 2 \\ y \leq 1 \end{cases}$

b. $\begin{cases} x + y < 3 \\ x - y > 5 \end{cases}$

c. $\begin{cases} y \geq -\frac{1}{3}x + 2 \\ y \leq \frac{2}{3}x - 1 \end{cases}$

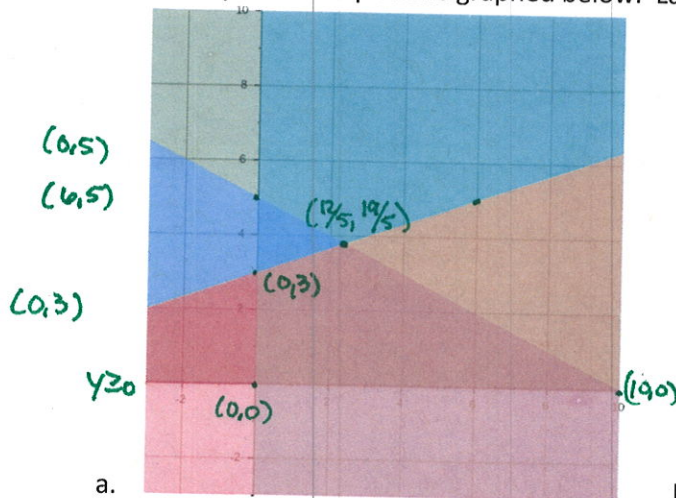
d. $\begin{cases} x + y < 2 \\ 3x - 5y \geq 0 \end{cases}$

e. $\begin{cases} x + 4y \leq 4 \\ 2x + 3y \geq 6 \end{cases}$

f. $\begin{cases} x + y \leq 30 \\ x \geq 2y \\ x \geq 0 \\ y \geq 0 \end{cases}$

Attached

6. Find the system of equations graphed below. Label all points of intersection.



a.

$x \geq 0$

$$\begin{aligned} 3y &= x + 9 \\ 2y &= -x + 10 \\ \hline 5y &= 19 \\ y &= \frac{19}{5} \\ x &= \frac{12}{5} \end{aligned}$$

$(0, 5), (10, 0)$

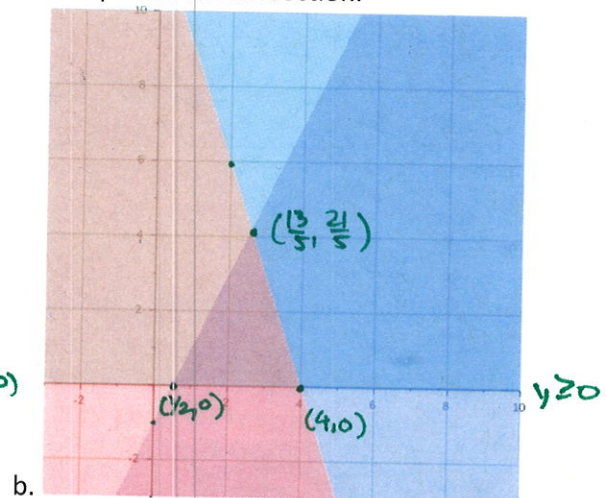
$$\frac{0-5}{10-0} = \frac{-5}{10} = -\frac{1}{2}$$

$y \leq -\frac{1}{2}x + 5$

$(0, 3), (6, 0)$

$$\frac{5-3}{6-0} = \frac{2}{6} = \frac{1}{3}$$

$y \leq \frac{1}{3}x + 3$



b.

$(0, -1)$
 $(2, 3)$

$$\frac{3-(-1)}{2-0} = \frac{4}{2} = 2$$

$y \leq 2x - 1$

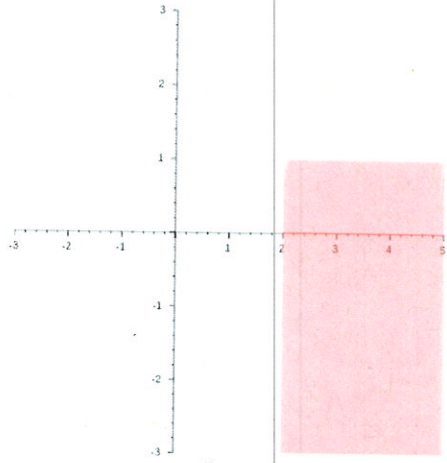
$(4, 0)$
 $(2, 6)$

$$\frac{6-0}{2-4} = \frac{6}{-2} = -3$$

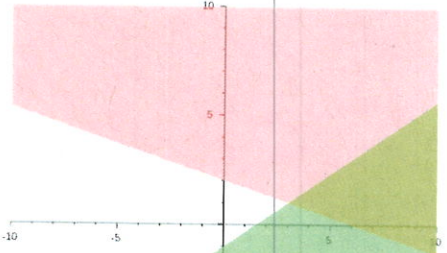
$y \leq -3(x-4)$
 $y \leq -3x + 12$

$$\begin{aligned} y &= 2x - 1 \\ -y &= 3x - 12 \\ \hline 0 &= 5x - 13 \\ \frac{13}{5} &= \frac{5x}{5} & x &= \frac{13}{5} \\ y &= \frac{21}{5} \end{aligned}$$

5.

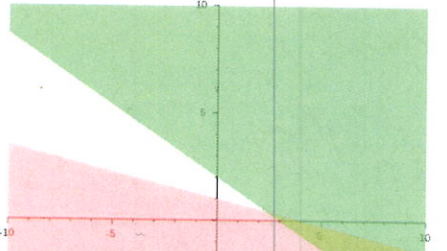


a.

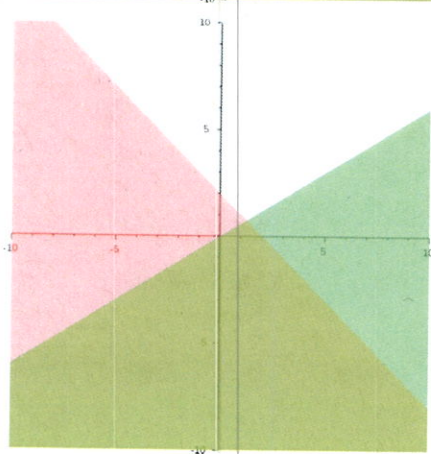


b.

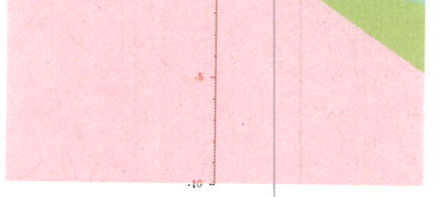
c.



d.



e.



f.

