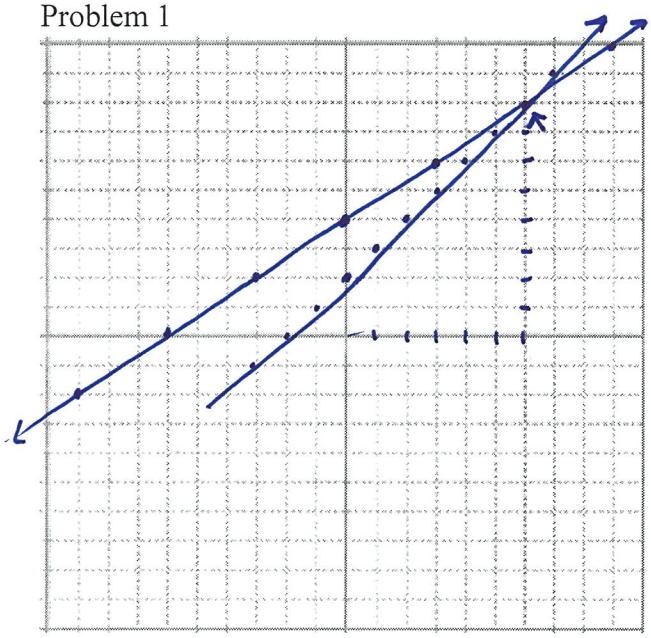
Graph each equation to find the point of intersection.

Test Name_____

*Remember to find a **nice starting point**, then use **the slope** to find other nice points.*

Problem 1

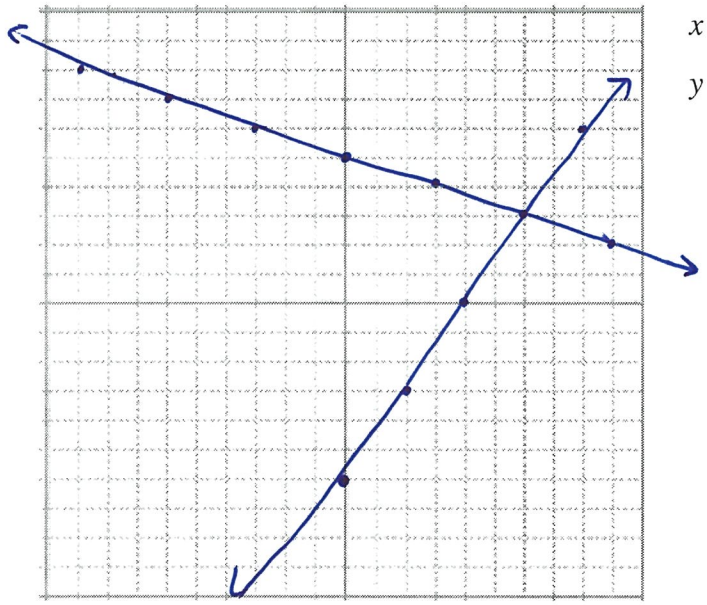


$y = \frac{2}{3}x + 4$ → (6,4) $m = 2/3$

$x - y = -2$ → (0,2) $m = 1/1$

Pt of Intersection (6, 8)

Problem 2

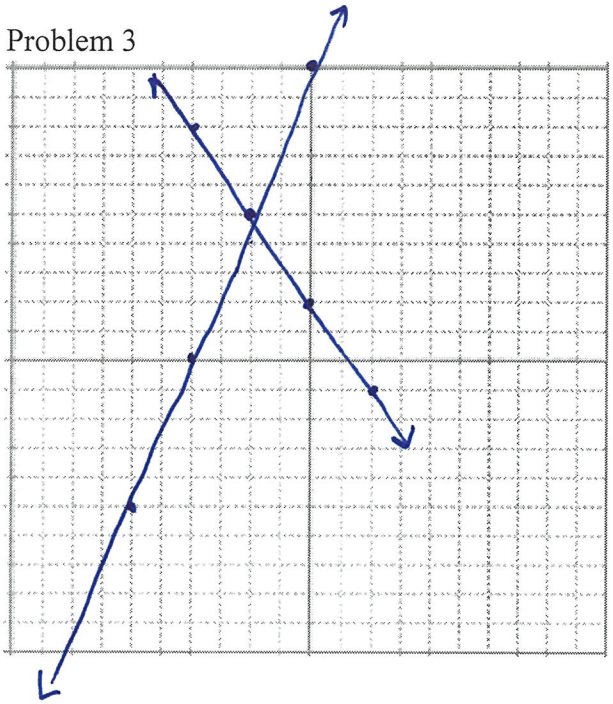


$x + 3y = 15$ → $m = -1/3$ (0,5)

$y = \frac{3}{2}x - 6$ → $m = 3/2$ (0,-6)

Pt of Intersection (6, 3)

Problem 3

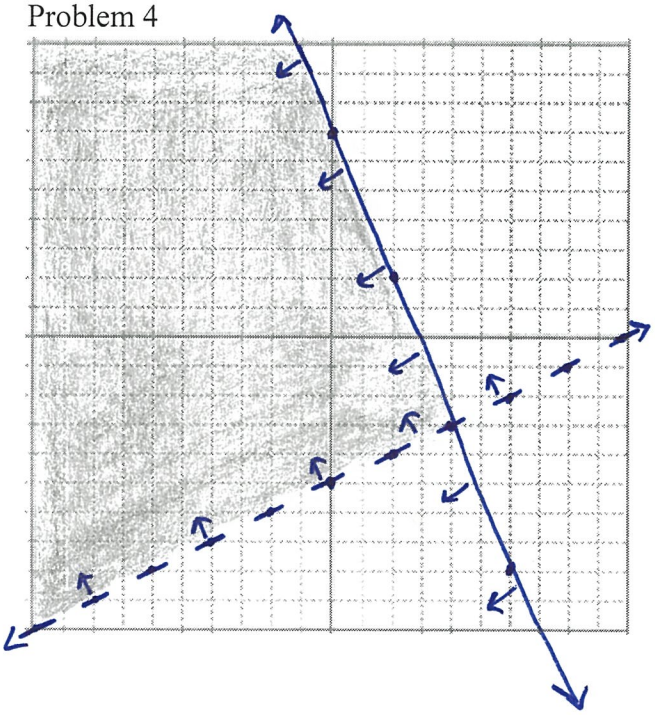


$3x + 2y = 4$ → $m = -3/2$ $(0, 2)$

$y = \frac{5}{2}x + 10$ → $m = 5/2$ $(0, 10)$

Pt of Intersection $(-2, 5)$

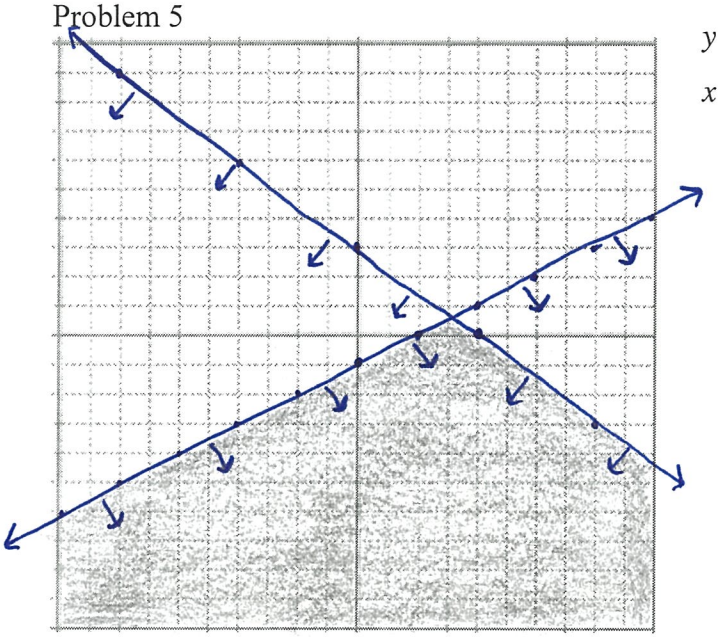
Problem 4



$y > \frac{1}{2}x - 5$ → $m = 1/2$ $(0, -5)$

$5x + 2y \leq 14$ → $m = -5/2$ $(0, 7)$

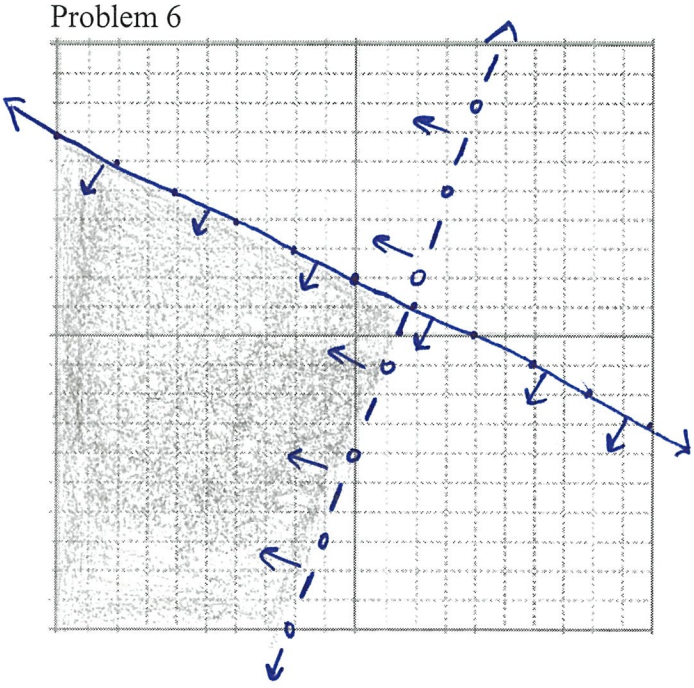
Problem 5



$y \le \frac{-3}{4}x + 3$ → m = $-3/4$ (0, 3)

$x - 2y \ge 2$ → m = $1/2$ (0, −1)

Problem 6



$y \le \frac{-1}{2}x + 2$ → m = $-1/2$ (0, 2)

$y > \frac{3}{1}x - 4$ → m = $\frac{3}{1}$ (0, −4)

Solve each system of equations using **substitution. Show your work!**

Problem 7

$2x - 3y = -7$
$x + 3y = 10$ → $x = -3y + 10$

Pt of Intersection $(1, 3)$

$2[-3y + 10] - 3y = -7$
$-6y + 20 - 3y = -7$
$-9y = -27$
$y = 3$

$x = -3[3] + 10$
$x = -9 + 10$
$x = 1$

Problem 8

$x - 3y = 14$ $\quad x = 3y + 14$
$3x + 2y = -13$

Pt of Intersection $(-1, -5)$

$3[3y + 14] + 2y = -13$
$9y + 42 + 2y = -13$
$11y = -13 - 42$
$11y = -55$
$y = -5$

$x = 3[-5] + 14$
$x = -15 + 14$
$x = -1$

Problem 9

$5x + y = 4$ → $y = -5x + 4$
$x - 2y = 3$

Pt of Intersection $(1, -1)$

$x - 2[-5x + 4] = 3$
$x + 10x - 8 = 3$
$11x = 11$
$x = 1$

$y = -5[1] + 4$
$y = -5 + 4$
$y = -1$

Problem 10

$x - 5y = -2$
$2x + 5y = -4$ $\quad x = 5y - 2$

Pt of Intersection $(-2, 0)$

$2[5y - 2] + 5y = -4$
$10y - 4 + 5y = -4$
$15y = 0$
$y = 0$

$x = 5[0] - 2$
$x = -2$

Problem 11

$-2x + y = -20$ $\quad y = 2x - 20$
$4x + 3y = 30$

Pt of Intersection $(9, -2)$

$4x + 3[2x - 20] = 30$
$4x + 6x - 60 = 30$
$10x = 90$
$x = 9$

$y = 2[9] - 20$
$y = 18 - 20$
$y = -2$

Solve each system of equations using **Linear Combination / Elimination. Show your work!**

Problem 12

$5x - y = -6$

$-1[x - y = -2]$

$5x - y = -6$

$-x + y = 2$

$4x = -4$

$x = -1$

$5[-1] - y = -6$

$-5 - y = -6$

$-5 + 6 = y$

$1 = y$

Pt of Intersection $(-1, 1)$

Problem 13

$x + 4y = 12$

$4[2x - y = 15]$

$x + 4y = 12$

$8x - 4y = 60$

$9x = 72$

$x = 8$

$8 + 4y = 12$

$4y = 4$

$y = 1$

Pt of Intersection $(8, 1)$

Problem 14

$x - y = 9$

$5x + y = 33$

$\frac{6x}{6} = \frac{42}{6}$

$x = 7$

$[7] - y = 9$

$7 - 9 = y$

$-2 = y$

Pt of Intersection $(7, -2)$

Problem 15

$x = 3y + 14$

$3x + 2y = -2$

$-3[x - 3y = 14]$

$3x + 2y = -2$

$-3x + 9y = -42$

$3x + 2y = -2$

$\frac{11y}{11} = \frac{-44}{11}$

$y = -4$

$x = 3[-4] + 14$

$x = -12 + 14$

$x = 2$

Pt of Intersection $(2, -4)$

Solve each system of equations using **Cramer's Rule. Show your work!**

Problem 16

$y = -3x - 2$

$2x - y = -5$

Pt of Intersection $(-1\frac{2}{5}, 2\frac{1}{5})$

$3x + y = -2$

$2x - y = -5$

$$x = \frac{\begin{vmatrix} C & B \\ -2 & 1 \\ -5 & -1 \end{vmatrix}}{\begin{vmatrix} A & B \\ 3 & 1 \\ 2 & -1 \end{vmatrix}} = \frac{2 - -5}{-3 - 2} = \frac{7}{-5} = -1\frac{2}{5}$$

$$y = \frac{\begin{vmatrix} A & C \\ 3 & -2 \\ 2 & -5 \end{vmatrix}}{-5} = \frac{-15 - -4}{-5} = \frac{-11}{-5} = 2\frac{1}{5}$$

Problem 17

$x - 3y = 4$

$2x + 3y = -1$

Pt of Intersection $(1, -1)$

$$x = \frac{\begin{vmatrix} C & B \\ 4 & -3 \\ -1 & 3 \end{vmatrix}}{\begin{vmatrix} A & B \\ 1 & -3 \\ 2 & 3 \end{vmatrix}} = \frac{12 - (3)}{3 - (-6)} = \frac{9}{9} = 1$$

$[1] \; -3y = 4$

$-3y = 3$

$y = -1$

Problem 18

$y = 2x - 6$

$2x - 3y = 5$

Pt of Intersection $(3\frac{1}{4}, \frac{1}{2})$

$-2x + y = -6$

$2x - 3y = 5$

$$x = \frac{\begin{vmatrix} C & B \\ -6 & 1 \\ 5 & -3 \end{vmatrix}}{\begin{vmatrix} A & B \\ -2 & 1 \\ 2 & -3 \end{vmatrix}} = \frac{18 - 5}{6 - 2} = \frac{13}{4} = 3\frac{1}{4}$$

$$y = \frac{\begin{vmatrix} A & C \\ -2 & -6 \\ 2 & 5 \end{vmatrix}}{4} = \frac{-10 - (-12)}{4} = \frac{2}{4} = \frac{1}{2}$$

Problem 19

$2x + 4y = 8$

$3x - 2y = 5$

Pt of Intersection $(2\frac{1}{4}, \frac{7}{8})$

$$x = \frac{\begin{vmatrix} C & B \\ 8 & 4 \\ 5 & -2 \end{vmatrix}}{\begin{vmatrix} A & B \\ 2 & 4 \\ 3 & -2 \end{vmatrix}} = \frac{-16 - 20}{-4 - 12} = \frac{-36}{-16} = \frac{9}{4} = 2\frac{1}{4}$$

$$y = \frac{\begin{vmatrix} A & C \\ 2 & 8 \\ 3 & 5 \end{vmatrix}}{-16} = \frac{10 - 24}{-16} = \frac{-14}{-16} = \frac{7}{8}$$

Solve each system with the **method of your choosing**.

Problem 20

$y = 2x - 1$

$x + 2y = 16$

Pt of Intersection $(3\frac{3}{5}, 6\frac{1}{5})$

$x + 2[2x-1] = 16$

$x + 4x - 2 = 16$

$5x = 18$

$x = 3\frac{3}{5}$

$y = 2[3\frac{3}{5}] - 1$

$y = 6\frac{1}{5}$

Problem 21

$2[2x - 3y = -17]$

$3[5x + 2y = -14]$

Pt of Intersection $(-4, 3)$

$4x - 6y = -34$

$15x + 6y = -42$

$19x = -76$

$x = -4$

$2[-4] - 3y = -17$

$-8 - 3y = -17$

$-3y = -9$

$y = 3$

Problem 22

$2[3x + 2y = 19]$

$x - 4y = 4$

Pt of Intersection $(6, \frac{1}{2})$

$6x + 4y = 38$

$x - 4y = 4$

$\frac{7x}{7} = \frac{42}{7}$

$x = 6$

$[6] - 4y = 4$

$-4y = -2$

$y = \frac{1}{2}$

Problem 23

$2x - 8y = 30$

$2[x + 4y = 7]$

Pt of Intersection $(11, -1)$

$2x - 8y = 30$

$2x + 8y = 14$

$4x = 44$

$x = 11$

$[11] + 4y = 7$

$4y = -4$

$y = -1$

Problem 24

$y = 3x + 2$

$6x + y = 8$

Pt of Intersection $(2/3, 4)$

$6x + [3x + 2] = 8$

$9x + 2 = 8$

$9x = 6$

$x = 2/3$

$y = 3[2/3] + 2$

$y = 4$

Problem 25

$-2[2x + 3y = 14]$

$4x - 2y = -12$

$-4x - 6y = -28$

$4x - 2y = -12$

$-8y = -40$

$y = 5$

$2x + 3[5] = 14$

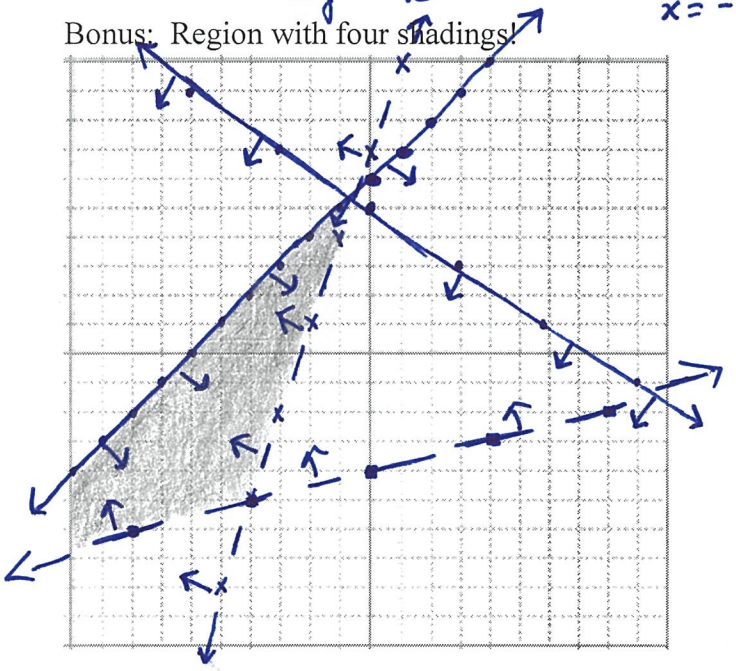
$2x + 15 = 14$

$2x = -1$

$x = -1/2$

Pt of Intersection $(-1/2, 5)$

Bonus: Region with four shadings!



$y \le \frac{-2}{3}x + 5$

$y > \frac{1}{4}x - 4$

$3x - y < -7 \rightarrow -y < -3x - 7 \rightarrow y > 3x + 7$

$x - y \ge -6 \rightarrow -y \ge -x - 6 \rightarrow y \le x + 6$