

Algebra 201-007-50 C2

Test 1

September 24, 2008

Name: SOLUTIONS

Student Number:

1. (8 marks). Solve for x in the following equations:

$$\text{a) } 4x = \frac{1}{3}(x+6) + 9$$

$$4x = \frac{1}{3}x + 2 + 9$$

$$4x = \frac{1}{3}x + 11$$

$$12x = x + 33$$

$$\frac{11x}{11} = \frac{33}{11}$$

$$x = 3$$

$$\text{b) } 2(x+1) = -3(x-5) + 6x - 12$$

$$2x + 2 = -3x + 15 + 6x - 12$$

$$2x + 2 = 3x + 3$$

$$-x = 1$$

$$\frac{-x}{-1} = \frac{1}{-1}$$

$$x = -1$$

2. (5 marks). A man has \$170 in ten and twenty dollar bills. How many of each does he have if he has 2 more ten dollar bills than twenty dollar bills?

LET x BE THE NUMBER OF TWENTY DOLLAR BILLS
THEN THERE ARE $x+2$ TEN DOLLAR BILLS

$$\therefore 20x + 10(x+2) = 170$$

$$30x + 20 = 170$$

$$\frac{30x}{30} = \frac{150}{30}$$

$$x = 5$$

\therefore HE HAS 5 TWENTY DOLLAR BILLS AND
7 TEN DOLLAR BILLS

3. (3 marks). Solve for b in the following formula: $F = bk - 5$

$$F + 5 = bk$$

$$\frac{F+5}{k} = b$$

4. (10marks). Solve the following linear inequalities. Give the solutions graph and solution set (indicate which is which for marks).

a) $5x - 4 > 7(x + 2) - 1$

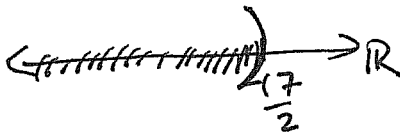
$$5x - 4 > 7x + 14 - 1$$

$$5x - 7x > 13 + 4$$

$$-2x > 17$$

$$x < -\frac{17}{2}$$

SOLUTION GRAPH:



SOLUTION SET:

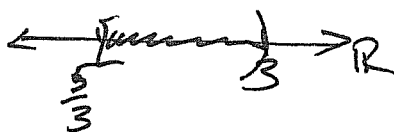
$$(-\infty, -\frac{17}{2})$$

b) $4 \leq 3x - 1 < 8$

$$5 \leq 3x < 9$$

$$\frac{5}{3} \leq x < 3.$$

SOLUTION GRAPH



SOLUTION SET

$$[\frac{5}{3}, 3)$$

5. (6 marks). Find the x -intercept and y -intercept of the linear equation $2x - 5y = 8$ (indicate which is which for marks). Use the intercepts to graph this equation.

$$x\text{-int: } y=0$$

$$2x - 5(0) = 8$$

$$2x = 8$$

$$x = 4$$

$\therefore (4, 0)$ is x -int

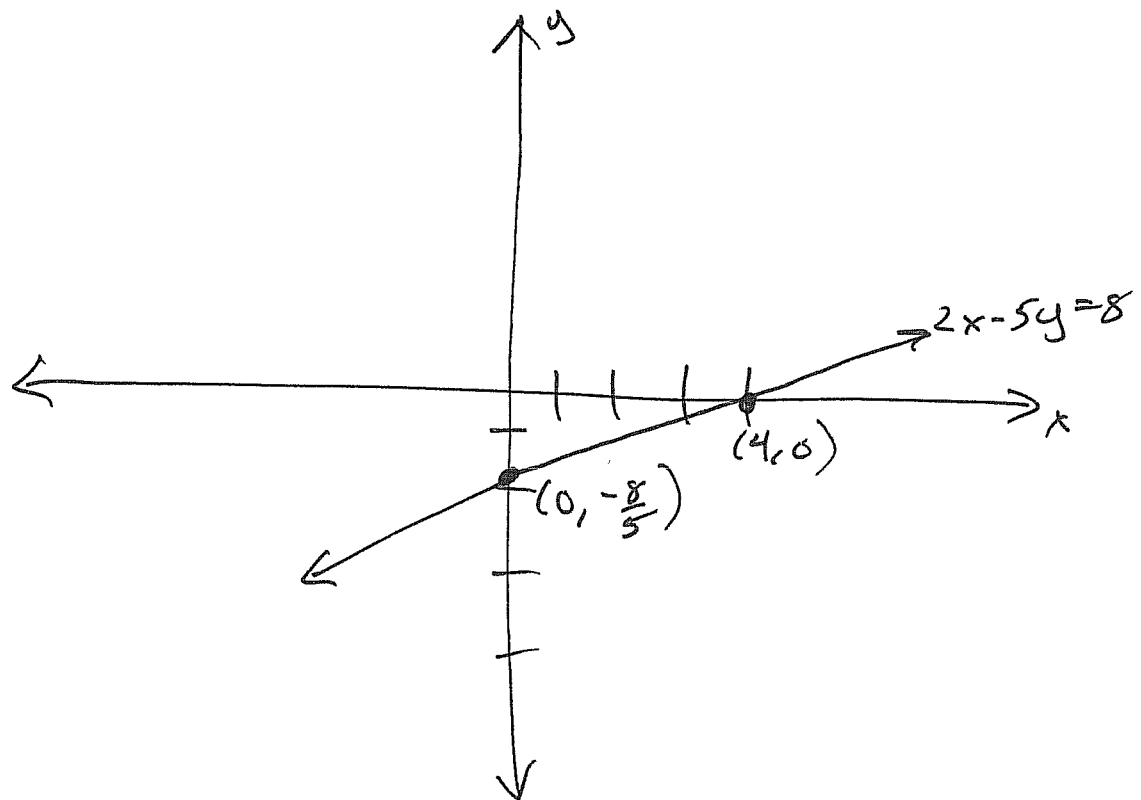
$$y\text{-int: } x=0$$

$$2(0) - 5y = 8$$

$$\frac{-5y = 8}{-5} \quad \frac{-5y = 8}{-5}$$

$$y = -\frac{8}{5}$$

$\therefore (0, -\frac{8}{5})$ is y -int



6. (6 marks). Find the equation of the line through the points (7, 6) and (4, -3).

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - 6}{4 - 7} \\ &= \frac{-9}{-3} \\ &= 3 \end{aligned}$$

$$\begin{aligned} y &= mx + b \\ 6 &= 3(7) + b \\ 6 &= 21 + b \\ 6 - 21 &= b \\ -15 &= b \end{aligned}$$

$$\therefore \boxed{y = 3x - 15}$$

7. (3 marks). Find the midpoint of the line segment between the points (-2, 5) and (4, 6).

$$\begin{aligned} (x_m, y_m) &= \left(\frac{-2 + 4}{2}, \frac{5 + 6}{2} \right) \\ &= \left(\frac{2}{2}, \frac{11}{2} \right) \\ &= \left(1, \frac{11}{2} \right) \end{aligned}$$

8. (5 marks). The line $15x + 3y = 17$ is perpendicular to the line $2y + kx = -8$. Find k .

$$15x + 3y = 17$$

$$3y = -15x + 17$$

$$y = -\frac{15}{3}x + \frac{17}{3}$$

$$y = -5x + \frac{17}{3}$$

$$\therefore m_1 = -5$$

$$2y + kx = -8$$

$$\frac{2y}{2} = -\frac{kx}{2} - \frac{8}{2}$$

$$y = -\frac{k}{2}x - 4$$

$$\therefore m_2 = -\frac{k}{2}$$

$$m_1 \cdot m_2 = -1$$

$$(-5) \left(-\frac{k}{2}\right) = -1$$

$$\frac{5}{2}k = -1$$

$$5k = -2$$

$$k = -\frac{2}{5}$$

9. (6 marks). The population of a town, y , has been growing since 1950 according to the linear equation:

$$y = 150x + 12000, \quad x \text{ years since 1950.}$$

a) What was the population in 1950?

$$x = 0$$

$$\therefore y = 150(0) + 12000$$

$$y = 12000$$

\therefore THE POPULATION IN 1950 WAS 12000

b) What was the population in 2000?

$$y = 150(50) + 12000$$

$$y = 7500 + 12000$$

$$= 19500$$

\therefore THE POPULATION IN 2000 WAS 19500

c) When will the population reach 22 050?

$$22\ 050 = 150x + 12\ 000$$

$$10\ 050 = 150x$$

$$x = \frac{10\ 050}{150} = 67$$

\therefore THE POPULATION WILL REACH 22050 IN 2017

10. (6 marks.) Graph $6x - 3y > -18$.

$$6x - 3y = -18$$

x-int. $y=0$

$$6x - 3(0) = -18$$

$$6x = -18$$

$$x = -3$$

$$\therefore (-3, 0)$$

y-int. $x=0$

$$6(0) - 3y = -18$$

$$-3y = -18$$

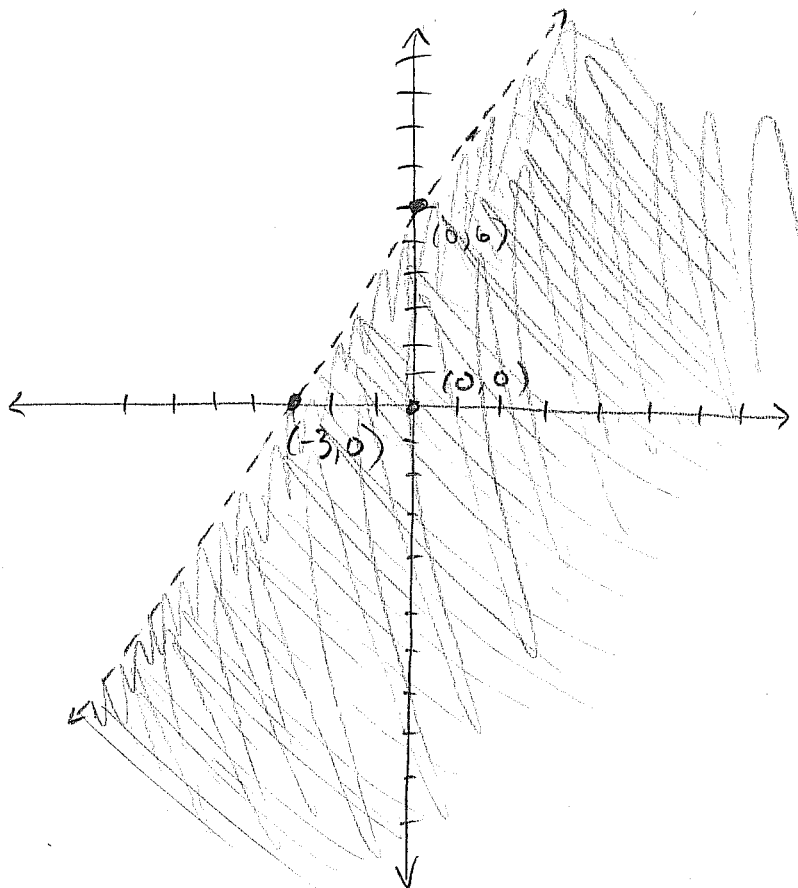
$$y = 6$$

$$\therefore (0, 6)$$

TEST POINT: $(0, 0)$

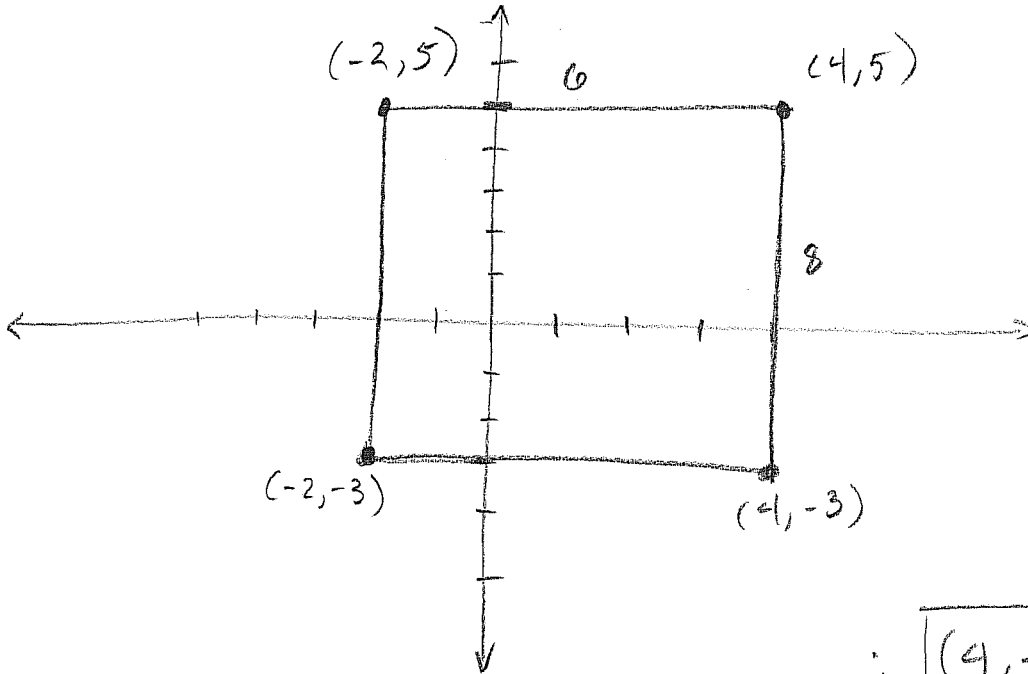
$$6(0) - 3(0) > -18$$

$$0 > -18 \text{ TRUE}$$



11. (5 marks.) The points $(-2, -3)$, $(-2, 5)$ and $(4, 5)$ are three vertices (corners) of a rectangle.

a) Find the fourth vertex.



$$\therefore \boxed{(4, -3)}$$

b) Find the perimeter of the rectangle.

$$\begin{aligned} P &= 2(8) + 2(6) = 16 + 12 \\ &= 28 \end{aligned}$$