

Math 099 - Summer 2015 - Test 2

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Name

KEY

Instructions. Only calculators are allowed on this examination. Point values of each problem are indicated. Always use the appropriate wording and units of measure in your answers (when applicable). **SHOW YOUR WORK NEATLY, PLEASE** (no work, no credit).

1. (10pts) Write the slope-intercept form of the line $5x + 10y = 4$.

$$Y = mx + b \quad \text{SOLVE FOR } Y:$$

$$\frac{10Y}{10} = -\frac{5X + 4}{10} \quad \rightarrow \quad Y = -\frac{1}{2}X + \frac{2}{5}$$

2. (10pts) Write the equation of the horizontal line passing through $\left(5, \frac{2}{5}\right)$.

$$\text{HORIZ LINE: } Y = b$$

$$\text{PLUG POINT: } \frac{2}{5} = b \quad \rightarrow \quad Y = \frac{2}{5}$$

3. (10pts) Write the equation of the line passing through $(-1, 3)$ and perpendicular to the line $2x - 3y = 4$.

$$\text{GIVEN LINE: } 2x - 3y = 4 \rightarrow \frac{-3y}{-3} = \frac{-2x + 4}{-3} \rightarrow y = \frac{2}{3}x - \frac{4}{3} \rightarrow$$

$$\rightarrow \text{GIVEN SLOPE} = \frac{2}{3}$$

$$\text{ASKED FOR: } y = mx + b \quad \left. \begin{array}{l} \text{PERPENDICULAR: } m = -\frac{1}{\frac{2}{3}} = -\frac{3}{2} \end{array} \right\}$$

$$y = -\frac{3}{2}x + b$$

$$\text{PLUG POINT } (-1, 3) \rightarrow 3 = -\frac{3}{2}(-1) + b \rightarrow b = 3 - \frac{3}{2} = \frac{3}{2} \rightarrow$$

$$\rightarrow y = -\frac{3}{2}x + \frac{3}{2}$$

4. (10pts) Write the equation of the line passing through the points $(-1, -3)$ and $(5, -1)$.

$$m = \text{SLOPE} = \frac{-1 - (-3)}{5 - (-1)} = \frac{2}{6} = \frac{1}{3}$$

$$y = \frac{1}{3}x + b$$

$$\text{PLUG ONE POINT: } (-1, -3) \rightarrow -3 = \frac{1}{3}(-1) + b \rightarrow$$

$$\rightarrow b = -3 + \frac{1}{3} = -\frac{8}{3}$$

$$y = \frac{1}{3}x - \frac{8}{3}$$

5. (15pts) You and your friend Tom have \$25 to spend for dinner. You have your own drinks and you want to order hamburgers and fries. There isn't much variety and only one kind of each menu item is available. Hamburgers cost \$2.50 each and fries are sold at \$2.15 per tray. Model your purchase options with a linear inequality, graphing the solution set in this context, then list at least three orders you can place.

ITEM	QUANT	RATE PRICE	VALUE COST
HAMB.	X	2.50	2.5X
FRIES	Y	2.15	2.15Y
TOTAL			≤ 25

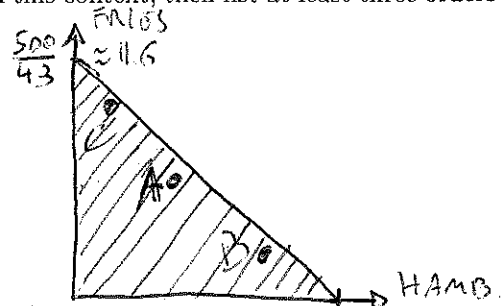
WITHIN BUDGET: $2.5X + 2.15Y \leq 25$

$$\frac{2.15Y}{2.15} \leq \frac{-2.5X + 25}{2.15} \quad \text{CONTEXT}$$

$$Y \leq -\frac{50}{43}X + \frac{500}{43}$$

SOLID, REGION BELOW

$$\begin{array}{l} X \geq 0 \\ Y \geq 0 \end{array}$$



	HAMB	FRIES
A	4	6
B	7	3
C	2	9

6. (15pts) Solve the following system of linear equations. If solving graphically, approximate to three decimal places, sketching the graph, and labeling lines and points.

$$\begin{cases} 3x + 2y = 5 \\ 2x - y = -1 \end{cases}$$

BY ADDITION

$$2 \cdot \text{EQ}_2 \quad 4x - 2y = -2$$

$$\text{EQ}_1 \quad 3x + 2y = 5$$

$$7x = 3 \rightarrow x = \frac{3}{7}$$

PLUG IN EQ₂:

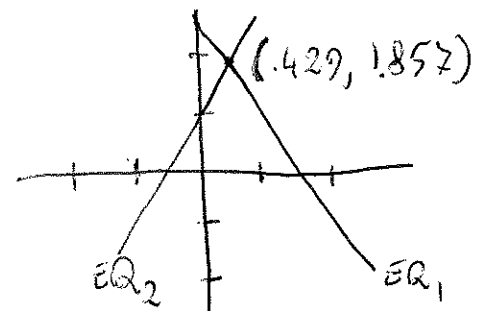
$$2\left(\frac{3}{7}\right) - y = -1 \rightarrow y = \frac{13}{7}$$

$$\text{SOLUTION: } \left(\frac{3}{7}, \frac{13}{7}\right) \approx (.429, 1.857)$$

CHECK: PLUG IN EQ₁:

$$3\left(\frac{3}{7}\right) + 2\left(\frac{13}{7}\right) = \frac{9+26}{7} = 5 \quad \checkmark$$

GRAPH



$$\boxed{2^{\text{ND}}} + \boxed{\text{TRACE}} + \boxed{5}$$

7. (15pts) A pharmacist wants to mix two solutions to obtain 120 cc of a solution that has a 15% concentration of a certain medicine. If one solution has a 20% concentration of the medicine and the other has a 12% concentration, how much of each solution should she mix?

SOLUTIONS	QUANT cc	RATE CONCENT.	$V = Q \cdot R$
#1	x	.2	.2x
#2	y	.12	.12y
TOTAL	120	.15	.15(120)

QUANT. EQ: $\begin{cases} X + Y = 120 \\ \text{VALUE EQ: } .2X + .12Y = 18 \end{cases}$

- .12 EQ₁: $-.12X - .12Y = -14.4$

$$\begin{array}{r} .08X \\ .08 \end{array} = \frac{3.6}{.08}$$

$x = 45$

PLUG $x = 45$ IN EQ₁:

$45 + Y = 120 \rightarrow Y = 75$

SOLUTION:

45 cc AT 20% AND

75 cc AT 12%.

CHECK:

$.2(45) + .12(75) = 9 + 9 = 18 \checkmark$

8. (15pts) Consider the system of inequalities below. Graph the solution set and label the boundary lines and the corner point (approximating to three decimal places).

$\begin{cases} -x + 2y \leq 3 \rightarrow 2y \leq x + 3 \rightarrow y \leq \frac{1}{2}x + \frac{3}{2} \\ y > 4x - 2 \end{cases}$

\downarrow
DASHED, ABOVE

\downarrow
SOLID, BELOW

