

Math 099 - Summer 2011 - Final

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Name

Key

Instructions. Only calculators are allowed on this examination. Each problem is worth 10 points. Always use the appropriate wording and units of measure in your answers (when applicable). SHOW YOUR WORK NEATLY, PLEASE (no work, no credit).

1. The total cost of a textbook rental is \$70 for the first four months plus \$12 for each additional month. Write two equations with inputs for each described with an inequality. Define your variables so y depends on x .

$X = \text{MONTHS OF RENTAL}$; $Y = \text{TOTAL RENTAL COST IN DOLLARS}$

$$Y = 70, 0 < X \leq 4$$

$$Y = 70 + 12(X - 4), X > 4$$

MONTHS AFTER
THE FIRST FOUR

2. Solve the inequality

$$16 > 6 - 2(4 + 3x) \geq 10$$

and graph its solution set, then write it in interval notation.

$$\begin{array}{r} 16 > 6 - 8 - 6x \geq 10 \\ \quad \quad \quad -2 \quad \quad \quad \\ +2 \quad +2 \quad \quad +2 \\ \hline \end{array}$$

$$\begin{array}{r} 18 > -6x \geq 12 \\ \hline -6 < \quad -6 \quad \leq -6 \end{array}$$

$$-3 < x \leq -2$$



INTERVAL

$$(-3, -2]$$

3. Solve the proportion $\frac{1+3x}{x} = \frac{34}{21}$.

$$\frac{1+3x}{x} = \frac{34}{21} \rightarrow 21(1+3x) = 34x$$

$$\begin{array}{r} 21 + 63x = 34x \\ -21 \quad -34x \quad -34x \\ \hline \end{array}$$

$$\frac{29x}{29} = \frac{-21}{29} \rightarrow x = -\frac{21}{29}$$

CHECK: $\frac{1+3(-\frac{21}{29})}{-\frac{21}{29}} = \left(\frac{29-63}{29}\right)\left(-\frac{29}{21}\right) = \frac{34}{21}$ ✓

4. Kim has 96 coins. He has \$ 5.85 altogether. If he has only dimes and nickels, how many of each does he have?

ITEM	Q	R	Q · R
		\$/c	VALUE IN \$
DIMES	X	.10	.10X
NICKELS	96-X	.05	.05(96-X)
TOTAL	96		5.85

$$.10X + .05(96-X) = 5.85$$

$$\begin{array}{r} .10X + 4.8 - .05X = 5.85 \\ -4.8 \quad -4.8 \end{array}$$

$$\frac{.05X}{.05} = \frac{1.05}{.05} \rightarrow x = 21 \text{ Dimes}$$

NICKELS ARE $96 - 21 = 75$

CHECK: $.10(21) + .05(75) = 2.10 + 3.75 = 5.85$ ✓

5. Find the slope and the y -intercept of the straight line $4x + 5y = 6$.

Solve for y : $y = mx + b$, $m = \text{"SLOPE"}; b = \text{"Y-INTERCEPT"}$

$$\begin{array}{r} 5y + 4x = 6 \\ -4x \quad -4x \\ \hline \end{array}$$

$$\frac{5y}{5} = \frac{-4x}{5} + \frac{6}{5}$$

$$y = -\frac{4}{5}x + \frac{6}{5}$$

$$\text{SLOPE} = -\frac{4}{5}$$

$$\text{X-INTERCEPT} = \frac{6}{5} \quad \text{OR} \quad (0, \frac{6}{5})$$

6. Write an equation of each straight line described.

- (a) Through $(0, 4)$ and $(-3, 5)$.

$(0, 4)$ IS THE y -INTERCEPT $\rightarrow b = 4 \rightarrow y = mx + 4$

$$\text{PLUG } (-3, 5) \text{ IN } y = mx + 4: \quad \underset{-4}{5} = \underset{-4}{m(-3)} + \underset{-4}{4} \rightarrow \underset{-3}{1} = \underset{-3}{-3m}$$

$$\rightarrow m = -\frac{1}{3} \quad (\text{CHECK: } m = \frac{5-4}{-3-0} = -\frac{1}{3} \checkmark)$$

EQUATION: $y = -\frac{1}{3}x + 4$

- (b) (10pts) Through $(1, 6)$ and parallel to the line with equation $y = 2x - 17$.

PARALLEL LINES HAVE SAME SLOPE: $m = 2$

$$y = 2x + b \quad \text{PLUG } x=1, y=6: \quad \underset{-2}{6} = \underset{-2}{2 \cdot (1)} + b$$

$$\rightarrow b = 4 \rightarrow \text{EQUATION: } y = 2x + 4$$

7. You want to order some pizza, the medium ones cost \$5 each and the large ones \$11 each. Without considering the tip for delivery (paid by your friends), you have at hand just \$85. Let x be the number of medium pizzas and y the number of large ones, write a linear inequality to describe all the possible orders you can make. List at least three different orders.

"TOTAL COST OF AN ORDER" = $5x + 11y \leq 85$

POSSIBLE ORDERS: $(17, 0)$; $(0, 7)$; $(4, 7)$.

8. Graph and show the solution set of the linear inequality $x + 3y > 6$.

SOLVE FOR y : $x + 3y > 6$ $\rightarrow 3y > -x + 6$ $\rightarrow y > -\frac{1}{3}x + 2$

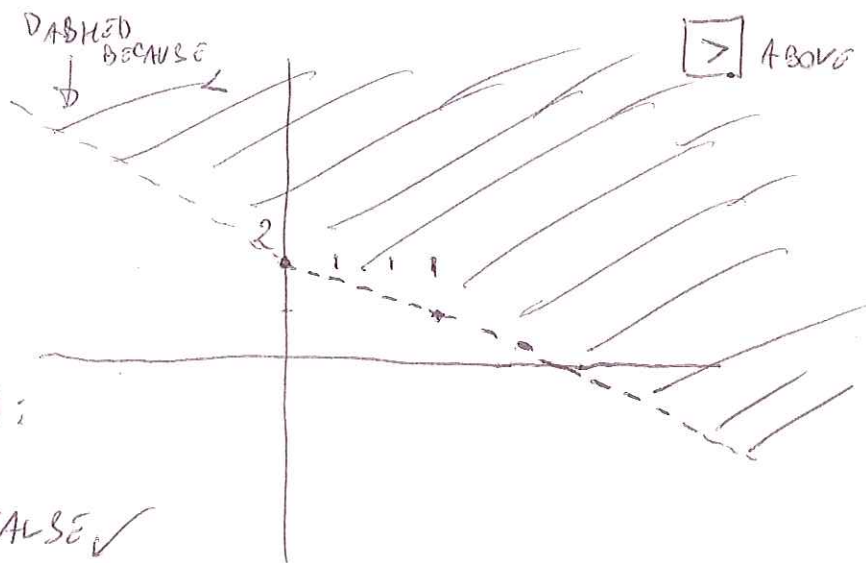
$-x$ $-x$ $\frac{3}{3}$ $\frac{-x}{3}$ $\frac{6}{3}$

$y > -\frac{1}{3}x + 2$

B.L.: $y = -\frac{1}{3}x + 2$

CHECK THE ORIGIN, $(0, 0)$:

$0 > -\frac{1}{3}(0) + 2$ FALSE ✓



9. Factor the polynomial $6x^2 + 11x + 3$.

$$\text{PRODUCT} = 3 \cdot 6 = 18 < \begin{matrix} 9 \\ 2 \end{matrix} \quad 9+2=11 \quad \checkmark$$

$$\text{Sum} = 11$$

$$\underbrace{6x^2 + 9x} + \underbrace{2x + 3}$$

$$3x(2x+3) + 1(2x+3)$$

$$(2x+3)(3x+1)$$

CHECK: $2x(3x) + 2x(1) + 3(3x) + 3(1)$
 $6x^2 + 2x + 9x + 3 \quad \checkmark$