Math 099 - Fall 2009 - Final

KEY

Instructor: Dr. Francesco Strazzullo Name_____

Instructions. Only calculators are allowed on this examination. Each problem is worth ten 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. Solve the equation $x + 11 = 3(1 - x)$.

$x+11 = 3(1) + 3(-x)$

$x+11 = 3-3x$

$+3x \quad -11 \quad -11+3x$

$4x = -8$

$\frac{4x}{4} = \frac{-8}{4} \rightarrow \boxed{x=-2}$

CHECK: $-2+11 \stackrel{?}{=} 3(1-(-2))$

$9 \stackrel{?}{=} 3\cdot(1+2)$ ✓

2. Simplify like terms in the following polynomial:
$(2x^3 - x + 3) - 3(x^3 + x + 2)$

$2x^3 - x + 3 - 3x^3 - 3x - 6$

$2x^3 - 3x^3 - x - 3x + 3 - 6$

$\boxed{-x^3 - 4x - 3}$

3. Solve the system of linear equations

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

BY ELIMINATION:

EQ1: $x + 2y = 3$

2 EQ2: $6x - 2y = 4$

$7x = 7 \rightarrow \frac{7x}{7} = \frac{7}{7} \rightarrow x = 1$

$3(1) - y = 2 \rightarrow 3 - 2 = y$

$-2 + y \quad -2 + y$

$\rightarrow y = 1$

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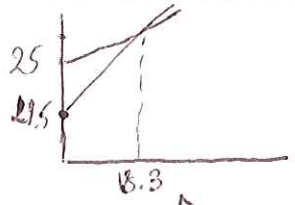
4. In Woodstock, a U-Haul 10-foot moving truck rental costs \$19.50 plus \$1.25 per mile for 10 hours. The same truck from Budget costs \$25 plus \$0.95 per mile

(a) For each agency, write an equation describing the total cost y as a function of the miles driven x.

U-HAUL: $y = 19.5 + 1.25x$

BUDGET: $y = 25 + .95x$



GRAPH

(b) How many miles does one need to drive so that the two costs are the same?

EQUATE THE Y'S: $Y_1 = Y_2 \rightarrow 19.5 + 1.25x = 25 + .95x$

$-19.5 \quad -.95x \quad -19.5 - .95x$

$\rightarrow \frac{.30x}{.30} = \frac{5.5}{.30} \rightarrow x = \frac{55}{3} = 18\frac{1}{3} \approx 18.\overline{3}$ MILES,

WHICH CAN BE DRIVEN IN 10 HOURS

5. In Canton the rental y of a 10-foot moving truck at U-Haul and at Budget can be modeled respectively by the two equations

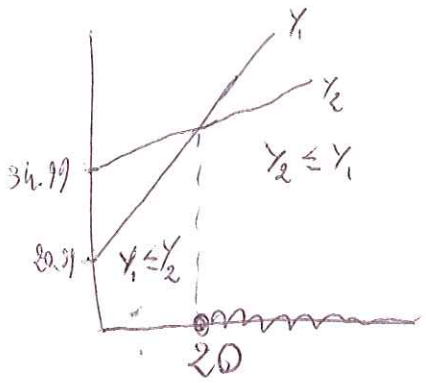
$$\begin{cases} y = 1.35x + 20.99 \\ y = .65x + 34.99 \end{cases}, \text{ for } x \text{ miles driven.}$$

Write an inequality describing how many miles one needs to drive so that the Budget rental is cheaper than the U-Haul, then solve this inequality.

U-HAUL: $Y_1 = 1.35x + 20.99$

BUDGET: $Y_2 = .65x + 34.99$

"BUDGET CHEAPER THAN U-HAUL": $Y_2 \leq Y_1$



$.65x + 34.99 \leq 1.35x + 20.99$

$-1.35x - 34.99 \quad -1.35x - 34.99$

$\frac{-.70x}{-.7} \leq \frac{-14}{-.7} \rightarrow x \geq 20$

6. Find the slope and the y-intercept for the equation $x - 2y = 6$.

SLOPE Y-INTERCEPT: $y = mx + b$

$x - 2y = 6$

$-x \quad -x$

$\frac{-2y}{-2} = \frac{-x}{-2} + \frac{6}{-2} \mapsto y = \frac{1}{2}x - 3$

Y-INTERCEPT $= -3$

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

7. Write the equation of each straight line described.

(a) Horizontal through $(1, -3)$.

HORIZ: $y = b$ PLUG POINT: $-3 = b$ THUS

$y = -3$

(b) With slope $m = -3$ and through $(0, 4)$.

$y = mx + b \mapsto y = -3x + b$ PLUG POINT: $4 = -3(0) + b \to$

$\to b = 4 \to y = -3x + 4$

8. Solve the proportion $\frac{7}{4} = \frac{15}{x}$.

$7x = 4(15) \mapsto \frac{7x}{7} = \frac{60}{7} \mapsto x = \frac{60}{7} = 8\frac{4}{7}$

9. One week a gallon of milk costs \$2.80. If the following week the price of milk rises of 14%, how much do you pay for one gallon of milk? $14\% = .14$

RISE $= 2.80(.14) = .392$

NEW PRICE = OLD + RISE $= 2.80 + .392 = 3.192 \approx 3.19$ DOLLARS

10. John has 56 coins. He has \$ 4.40 altogether. If he has only dimes and nickels, how many of each does he have?

ITEM	Q	R \$	Q·R
DIMES	X	.10	$.10X$
NICKELS	Y	.05	$.05Y$
TOTAL	$X+Y = 56$		$.10X+.05Y = 4.40$

SUM ↓

PRODUCT →

$\begin{cases} X+Y = 56 \\ .10X + .05Y = 4.4 \end{cases}$

$X+Y=56 \rightarrow Y = 56-X$ (PLUG)

$.10X + .05(56-X) = 4.4$

$.10X + .05(56) - .05X = 4.4$

$.05X + 2.8 = 4.4$

$-2.8 \quad -2.8$

$\frac{.05X}{.05} = \frac{1.6}{.05} \rightarrow X = 32$

$Y = 56 - 32 = 24$

32 DIMES AND 24 NICKELS