Math 099 - Summer 2010 - Test 2

Name_____ KEY _____

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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. (*15pts*) The total cost of an air-compressor rental is \$45 for the first day plus \$30 for each additional day. Write two equations with inputs for each described with an inequality. Define your variables so y depends on x.

THE TOTAL COST Y DEPENDS ON THE RENTAL DAYS X:

$$Y = 45 \quad \text{FOR} \quad 0 < X \leq 1$$
$$Y = 45 + 30 \cdot (X-1) \quad \text{FOR} \quad X > 1$$

2. (*10pts*) Solve the equation $4x + 6 = 2(1 + 3x) + 1$.

REWRITE EXPANDING:
$$4X + 6 = 2 + 6X + 1$$
$$-6X - 6 \qquad -6 - 6X$$
$$\overline{\qquad\qquad\qquad}$$
$$-2X = -3$$
$$\frac{-2X}{-2} \qquad \frac{-3}{-2}$$
$$X = \frac{3}{2}$$

3. (*10pts*) Give the interval which is the solution set for the inequality $2x < 3x + 5$.

$$2X < 3X + 5$$
$$-3X \qquad -3X$$
$$-X < 5$$
$$\frac{-X}{-1} \geq \frac{5}{-1}$$
$$X > -5$$

SOLUTION SET: $\left(-5, +\infty\right)$

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4. (10pts) Find the slope and the y-intercept for the equation $3x + 2y = 6$.

WE MUST SOLVE FOR Y, IN ORDER TO OBTAIN THE SLOPE-INTERCEPT
FORM $Y = mx + b$.

$$3x + 2y = 6$$
$$-3x \qquad -3x$$

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

$\Rightarrow Y = \left(-\frac{3}{2}\right)x \left(+ 3\right)$

SLOPE $= -\frac{3}{2}$

Y-INTERCEPT $(0, 3)$

5. Write the equation of each straight line described.

(a) (10pts) Through $(2, 3)$ and $(-1, 1)$.

SLOPE $= \dfrac{Y_2 - Y_1}{X_2 - X_1} = \dfrac{3 - 1}{2 - (-1)} = \dfrac{2}{2 + 1} = \dfrac{2}{3} \Rightarrow Y = \dfrac{2}{3}x + b$

PLUG A POINT, HERE $(-1, 1)$: $1 = \dfrac{2}{3} \cdot (-1) + b$

$+\frac{2}{3} \qquad +\frac{2}{3}$

$\Rightarrow b = 1\frac{2}{3} = \dfrac{5}{3}$

EQUATION: $Y = \dfrac{2}{3}x + \dfrac{5}{3}$

(b) (15pts) Through $(1, 4)$ and perpendicular to the line with equation $y = 3x + 1$.

$Y = m_1 x + b_1$ IS PERPENDICULAR TO $Y = m_2 x + b_2$ IF $m_2 = -\dfrac{1}{m_1}$

HERE $m_1 = 3$ SO THAT $m_2 = -\dfrac{1}{3}$.

OUR LINE IS $Y = -\dfrac{1}{3}x + b$. PLUG $(1, 4)$: $4 = -\dfrac{1}{3} \cdot 1 + b \Rightarrow$

$\Rightarrow b = 4 + \dfrac{1}{3} = \dfrac{7}{3}$. THEREFORE:

$$Y = -\dfrac{1}{3}x + \dfrac{7}{3}$$

(c) (10pts) Horizontal through $(-4, 5)$.

HORIZONTAL LINE: $Y = b$, HERE $Y = 5$

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6. (15*pts*) Hwang prepays $50 on racquetball court rental of $2 per hour. Write the equation describing the prepaid amount of dollars that remains as a function of the hours of rental time.

AMOUNT REMAINING = PREPAID − RENTAL

$$Y = 50 - 2 \cdot X$$

WHERE Y IS IN DOLLARS AND X IS THE HOURS OF RENTAL.

7. (15*pts*) You are starting a new diet, which allows you a maximum of 240 calories in daily snacks. Caramel candies have 40 calories each, and ginger snaps have 20 calories each. Write an inequality describing possible combinations of the two types of snacks that can be eaten.

SNACKS	QUANTITIES	CALORIES	TOTAL CALORIES
CARAMEL	X	40	40X
GINGER	Y	20	20Y
TOTALS	X+Y		40X+20Y

TOTAL CALORIES AT MOST 240, THAT IS:

$$40X + 20Y \leq 240$$

8. (15*pts*) Draw a graph showing all possible pairs (x, y) for which $2x + y > 5$.

SOLVE FOR Y: $Y > -2X + 5$

REGION ABOVE THE BOUNDARY

LINE: $Y = -2X + 5$

OTHERWISE TEST:

$(0, 0)$ NOT ON BOUNDARY LINE

$2 \cdot 0 + 0 = 0 \not> 5$ THE OTHER REGION IS SOLUTION.

DASHED