Math 099 - Fall 2009 - Test 3

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) You work for h hours at $6.25 per hour. If you obtain a 15% rise, how much do you earn for working 6 hours?

OLD EARNINGS $= 6.25 \cdot 6 = 37.5$

"15% OF OLD EARNINGS" = "RISE" $= .15 \cdot 37.5 = 5.625$

NEW EARNINGS $=$ OLD + RISE $= 37.5 + 5.625 = 43.125$

WITH THE 15% RISE I EARN $43.125 FOR WORKING 6 HOURS.

NOTICE THAT MY NEW HOURLY PAY IS OF $6.25 \cdot 1.15 = 7.1875$ DOLLARS PER HOUR

2. (15pts) Find the slope and the y-intercept for the equation $x - 4y = 4$.

WRITE IT IN SLOPE-INTERCEPT FORM:

$x - 4y = 4$

$-x \qquad -x$

$\rightarrow \dfrac{-4y}{-4} = \dfrac{-x+4}{-4}$

$\rightarrow Y = \dfrac{-x}{-4} + \dfrac{4}{-4} \rightarrow Y = \dfrac{1}{4}x - 1$

THE SLOPE IS $\dfrac{+}{4}$

THE Y-INTERCEPT IS -1 $\left(\text{OR RATHER } (0, -1) \right)$

3. Write the equation of each straight line described.

   (a) (10pts) Vertical through $(3, -1)$.

   NO SLOPE: $\boxed{X = 3}$

   $\downarrow$

   $X = C$

   (b) (15pts) Through $(3, 9)$ and $(1, 1)$.

   $m = \text{SLOPE} = \dfrac{Y_2 - Y_1}{X_2 - X_1} = \dfrac{9-1}{3-1} = \dfrac{8}{2} = 4 \rightarrow Y = mx + b$ IS NOW

   $Y = 4x + b \rightarrow$ PLUG A POINT TO FIND b, I CHOOSE $(1, 1)$:

   $1 = 4 \cdot 1 + b \rightarrow b = 1 - 4 = -3 \rightarrow \boxed{\text{EQUATION: } Y = 4X - 3}$

1

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(c) (15pts) With slope $m = 5/3$ and through $(-3, 1)$.

$$Y = \frac{5}{3}x + b, \quad \text{PLUG } (-3, 1): \quad 1 = \frac{5}{3} \cdot (-3) + b \longrightarrow$$

$$\longrightarrow 1 = -5 + b \longrightarrow b = 1 + 5 = 6$$

EQUATION: $Y = \frac{5}{3}x + 6$

4. A prepaid telephone card costs $12. Each minute costs $0.03 and there is none connection fee.

(a) (10pts) What equation describes the value remaining on the card after x minutes?

$$Y = \text{"VALUE REMAINING ON THE CARD"}.$$

$$Y = 12 - .03X,$$

↑ VALUE INITIALLY

↓ COST FOR AN X-MINUTES CALL.

(b) (10pts) How many minutes does one need to talk so that $2 are left on the card?

IT IS ASKED FOR THE VALUE OF X FOR WHICH $Y = 2$.

$$2 = 12 - .03X \longrightarrow 2 - 12 = -.03X \longrightarrow \frac{-10}{-.03} = \frac{-.03X}{-.03} \longrightarrow$$

$$\longrightarrow X = 333.\overline{3}.$$

ONE NEEDS TO TALK FOR ABOUT 333 MINUTES SO THAT $2 ARE LEFT ON THE CARD.

5. (15pts) Carmen rents a Cessna 152 for $126 per hour plus $28 insurance fee. Write the equation describing the total cost in dollars as a function of the flying hours.

Y IS THE TOTAL COST
X IS THE FLYING HOURS

$$Y = 28 + 126 X$$

↓ INSURANCE FEE, PAID AT THE BEGINNING, THAT IS FOR $X = 0$

↖ FLYING RATE, THAT IS, THE SLOPE

6. (10pts) To meet expenses, a local theater group has a ticket sales goal of $2400. Regular tickets sell for $16, and matinee tickets sell for $12. Write an inequality describing possible combinations of ticket sales that would meet the goal.

$X =$ "NUMBER OF REGULAR TICKETS" $\longrightarrow$ $16 \cdot X$ (DOLLARS)

$Y =$ "NUMBER OF MATINEE TICKETS" $\longrightarrow$ $12 \cdot Y$ "

TOTAL REVENUE $= 16X + 12Y$. TO MEET THE EXPENSES ONE MUST HAVE

$$16X + 12Y \geq 2400$$

7. (10pts) Draw a graph showing all possible pairs (x, y) for which $3x - y > 2$.

IT IS ASKED TO SHADE THE SOLUTION SET OF $3X - Y > 2$.

I) "SOLVE FOR Y":

$$\frac{-Y}{-1} > \frac{-3X + 2}{-1} \longrightarrow Y < 3X - 2$$

DASHED BOUNDARY LINE

BOUNDARY LINE: $Y = 3X - 2$

$\boxed{<}$ SAYS BELOW BOUNDARY LINE

OTHERWISE:

II) BOUNDARY LINE: $3X - Y = 2$

1) TO DRAW IT WE CAN LOOK FOR THE INTERCEPTS:

X-INTERCEPT: $Y = 0 \longrightarrow 3X = 2 \longrightarrow X = \frac{2}{3}$

Y-INTERCEPT: $X = 0 \longrightarrow -Y = 2 \longrightarrow Y = -2$

2) TEST POINT $(0, 0)$: $3 \cdot 0 - 0 > 2$ FALSE.

3 RISE

-2 1 RUN

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