Math 099 - Summer 2010 - Test 1

Instructor: Dr. Francesco Strazzullo   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. Write each sentence with an equation. Let x be the input. Let y be the output. The output is:

   (a) (*7pts*) three times the input decreased by four;

   $$y = 3x - 4$$

   (b) (*7pts*) thirty more than 2.5% of the input; $2.5\% = \dfrac{2.5}{100} = .025$

   $$y = 30 + .025x$$

   (c) (*7pts*) the reciprocal of twice the opposite of the input.

   $$y = \frac{1}{2(-x)}$$

2. (*24pts*) The following is an input-output table, where the input x is the amount in kilogallon of water consumed and the output y is the cost charged.

x	y	model
$0 \leq x \leq 20$	2.35 dollars per kilogallon plus a fixed cost of 6.35 dollars	$2.35x + 6.35$
$20 < x \leq 100$	2.16 dollars per kilogallon plus a fixed cost of 10.15 dollars	$2.16x + 10.15$
$x > 100$	2.06 dollars per kilogallon plus a fixed cost of 20.15 dollars	$2.06x + 20.15$

   Fill the third column, writing each rule with an equation in x and y.

   THE COST IS GIVEN BY PRICE PER Kgal OF WATER TIMES WATER CONSUMED PLUS THE FIXED COST. THAT IS: $y = p \cdot x + f$

3. (*18pts*) In the setting of Exercise 2, use the following chart

x	y
$0 \leq x \leq 50$	2.55x + 5.60
$50 < x \leq 100$	2.25x + 20.60
$x > 100$	2.06x+39.6

   to calculate the costs for the following consumptions.

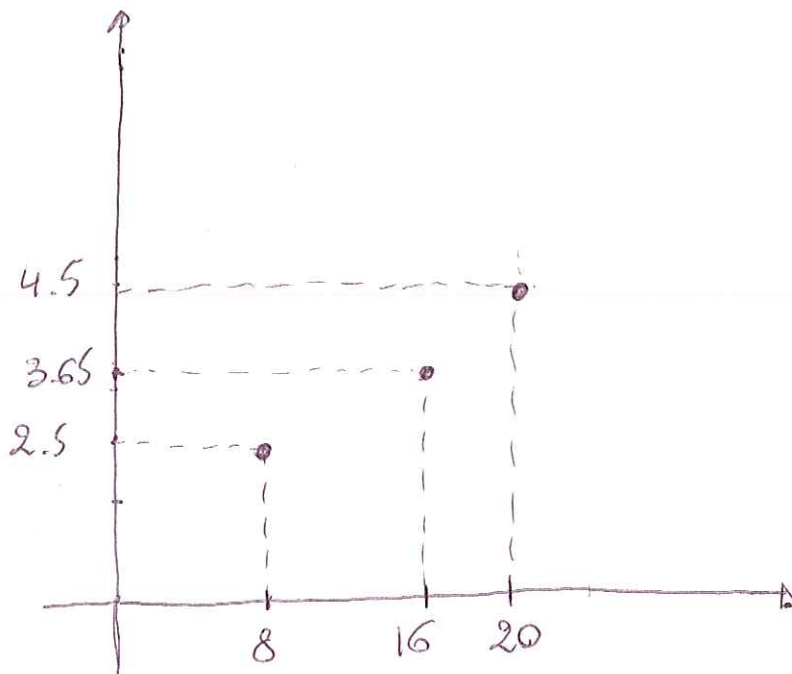| Water consumed	Cost	
15 kgal	\$43.85	$2.55 \cdot 15 + 5.6$
35 kgal	\$94.85	$2.55 \cdot 35 + 5.6$
100 kgal	\$245.60	$2.25 \cdot 100 + 20.6$
110 kgal	\$266.20	$2.06 \cdot 110 + 39.6$

1

4. (18pts) Soft drinks at a movie theater have the following costs: 8 oz for \$2.5, 16 oz for \$3.65, and 20 oz for \$4.50. Graph the volume and cost for these drinks as individual ordered pairs.

$X = $ VOLUME IN OZ , $Y = $ COST IN DOLLARS

X	Y
8	2.5
16	3.65
20	4.5

5. (16pts) Combine like terms in the following expressions:

(a) $4 - 3x^2 + 4y + 7x^2 + 2 - y$ $= 7x^2 - 3x^2 + 4y - y + 4 + 2$
$= 4x^2 + 3y + 6$

(b) $2x^3(2-x) - 4x^3 + 3x^4$

$= 2x^3 \cdot 2 + 2x^3 \cdot (-x) - 4x^3 + 3x^4 = 4x^3 - 2x^4 - 4x^3 + 3x^4$
$= 3x^4 - 2x^4 + 4x^3 - 4x^3 = 1x^4 + 0x^3 = x^4$

6. (8pts) Combine like terms in the expression $2.64b + 2.39a - 4.00a + 5\frac{1}{3} - \frac{1}{5}$.

$2.64b + (2.39 - 4)a + 5 + \frac{1}{3} - \frac{1}{5}$

$= 2.64b - 1.61a + \dfrac{5 \cdot 15 + 1 \cdot 5 - 1 \cdot 3}{15}$

$= 2.64b - 1.61a + \dfrac{77}{15}$ $\left(\text{OR } 2.64b - 1.61a + 5\frac{2}{15}\right)$

OR

$5.1\overline{3}$

2

7. (20pts) Using the formula $V = \pi r^2 h$, find the volume of a 2 feet pile of flat dishes, where each dish has a radius of 3 inches.

WE MUST USE THE SAME UNITS FOR RADIUS AND HIGHT

3 in

2 Ft

IN INCHES:

1 FT = 12 IN $\xrightarrow{\text{HIGHT}}$ 2 FT = 2·12 IN = 24 IN

$V = \pi \cdot (3 \text{ in})^2 \cdot 24 \text{ in} = \pi \cdot 9 \cdot 24 \text{ in}^3$

$\approx 678.58 \text{ in}^3$

OR

IN INCHES

1 FT = 12 in $\xrightarrow{\text{RADIUS}}$ 3 in = $\frac{3}{12}$ FT = $\frac{1}{4}$ FT

$V = \pi \cdot \left(\frac{1}{4} \text{ Ft}\right)^2 \cdot 2 \text{ ft} = \pi \cdot \frac{1}{16} \cdot 2 \text{ ft}^3 = \frac{\pi}{8} \text{ Ft}^3$

$\approx .392699 \text{ ft}^3$

CHECK:

VOLUME CONVERSION: 1 ft = 12 in $\longrightarrow$ 1 Ft^3 = 12^3 in^3

= 1728 in^3

$.392699 \text{ ft}^3 = .392699 \cdot 1728 \text{ in}^3 \approx 678.58 \text{ in}^3$ ✓