Math 099 - Summer 2013 - Test 1

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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. Translate each phrase into an algebraic equation.

   (a) (5pts) A quarter of the sum of a number and five.

   $$\frac{1}{4} \cdot (x + 5) \quad OR \quad \frac{1}{4}(x+5)$$

   (b) (5pts) 10 less than 6.1% of a number.

   SUBTRACT 10 FROM $0.061 \cdot x$ OR $.061X - 10$

   $6.1\% = \frac{61}{100} = 0.061$

   (c) (5pts) The reciprocal of seven.

   $$\frac{1}{7}$$

2. Combine like terms in the following expressions:

   (a) (5pts) $4 - 3x^2 + 5y + 6x^2 - 7 + y$

   $$(4 - 7) + (-3 + 6)x^2 + (5+1)y$$
   $$-3 + 3x^2 + 6y$$

   (b) (5pts) $x(x + 3) + 3x - 2x^2 + 3$

   1) $\overline{X \cdot X + 3X} + 3X - 2X^2 + 3$

   2) $X^2 + 6X - 2X^2 + 3$

   3) $(1 - 2)X^2 + 6X + 3$

   4) $-X^2 + 6X + 3$

   (c) (5pts) (14pts) $x + 1.05y - 3.2y - \frac{7}{15} + \frac{1}{12}$

   $$X - 2.15Y + \frac{-7 \cdot 4 + 1 \cdot 5}{60}$$

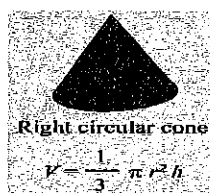 $$X - 2.15Y - \frac{23}{60} \qquad OR \qquad X - \frac{43}{20}Y - \frac{23}{60}$$

   $$OR \quad X - 2.15Y - 0.38\overline{3}$$

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3. (17pts) Solve the equation $3 - 4x = 5(2 - 3x) + 4$.

$$3 - 4X = 10 - 15X + 4$$
$$\underline{-3 + 15x \qquad +15X - 3}$$

$$\frac{11X}{11} = \frac{11}{11} \longrightarrow X = 1$$

CHECK: $3 - 4(1) \overset{?}{=} 5(2 - 3(1)) + 4$

$3 - 4 \overset{?}{=} 5(2 - 3) + 4$

$-1 \overset{?}{=} 5(-1) + 4$

$-1 \overset{?}{=} -5 + 4$ ✓

4. (18pts) The formula for the volume of a cone is in the following picture

Right circular cone
$V = \frac{1}{3}\pi r^2 h$.

(a) Solve the above formula for h.

$$\frac{V}{\frac{1}{3}\pi r^2} = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2} \longrightarrow \frac{3V}{\pi r^2} = h \quad OR$$

$$h = \frac{3V}{\pi r^2}$$

(b) When filled, a conic cup contains about 23 cubic inches (in³) of water and its rim has a radius of 2 in. What is the height of this cup? UNKOWN IS h

DATA: $V = 23$ in³, $r = 2$ in

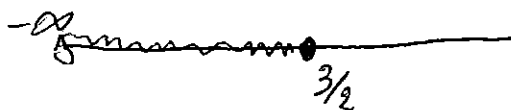PLUG IN (a): $h = \dfrac{3 \cdot 23}{\pi(2)^2} \approx 5.49$ INCHES.

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5. (17*pts*) Give the interval which is the solution set for the inequality $2x + 1 \geq 6x - 5$.

$$2x + 1 \geq 6x - 5$$
$$\underline{-6x - 1 \quad -6x - 1}$$

$$\frac{-4x}{-4} \geq \frac{-6}{-4}$$

$$x \leq \frac{3}{2}$$

GRAPH SOLUTION

$$-\infty \text{ ————●} \frac{3}{2}$$

INTERVAL:

$$\left(-\infty, \frac{3}{2}\right]$$

6. (18*pts*) You have \$20 to spend for a new T-shirt. If there is a 7% tax on the sale price, what is the sale price of the most expensive T-shirt that you can afford?

BUDGET = 20 (DOLLARS)

COST $\leq$ BUDGET $\rightarrow$ COST $\leq$ 20

COST = "SALE PRICE" + "TAX"

"SALE PRICE" = x (DOLLARS)

"TAX" = "7% OF SALE PRICE" = $\frac{7}{100} \cdot x$

COST = $x + .07x$

$\rightarrow$ $x + .07x \leq 20$

$$1.07x \leq 20$$
$$\frac{1.07x}{1.07} \leq \frac{20}{1.07}$$
$$x \leq 18.69$$

THE MOST EXPENSIVE T-SHIRT MUST HAVE A SALE PRICE OF 18.69 DOLLARS.

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