Monday Feb 2nd, 2015

Name: SOLUTIONS

ID #:

NOTE: YOUR QUIZ HAD THESE QUESTIONS IN REVERSE

Math 102-001 Winter 2015 Quiz #2

1. Solve each inequality: *[4 marks]*

a) $\frac{2}{3}x + 2 > 1 - \frac{3}{4}x$

$$8x + 24 > 12 - 9x$$

$$17x > -12$$

$$x > -\frac{12}{17}$$

b) $-2 < 3 - 5x \leq 4$

$$-5 < -5x \leq 1$$

$$1 > x \geq -\frac{1}{5}$$

$$-\frac{1}{5} \leq x < 1$$

2. Solve the equation and verify your answer(s): $|2x - 3| = 1 - 4x$ *[4 marks]*

CASE I: IF $2x - 3 \geq 0$

$$2x - 3 = 1 - 4x$$

$$6x = 4$$

$$x = 4/6$$

CHECK: $\left|2\left(\frac{4}{6}\right) - 3\right| = 1 - 4\left(\frac{4}{6}\right)$

$$\left|-\frac{10}{6}\right| = -\frac{10}{6} \quad \times$$

NOT A SOLUTION!

CASE II: IF $2x - 3 < 0$

$$-(2x - 3) = 1 - 4x$$

$$2x = -2$$

$$x = -1$$

CHECK: $|2(-1) - 3| = 1 - 4(-1)$

$$|-5| = 5 \quad \checkmark$$

$\boxed{\text{ONLY SOLUTION: } x = -1}$

3. Test the equation $y^2 + 1 = x^2 - 2xy$ for each type of symmetry discussed in class (across the x-axis, across the y-axis, and across the origin). *[4 marks]*

X-AXIS: $(-y)^2 + 1 = x^2 - 2x(-y)$

$$y^2 + 1 = x^2 + 2xy \Rightarrow \text{NO}$$

Y-AXIS: $y^2 + 1 = (-x)^2 - 2(-x)y$

$$y^2 + 1 = x^2 + 2xy \Rightarrow \text{NO}$$

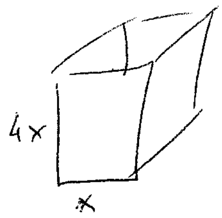
ORIGIN: $(-y)^2 + 1 = (-x)^2 - 2(-x)(-y)$

$$y^2 + 1 = x^2 - 2xy \Rightarrow \text{YES!}$$

4. An open rectangular box has a square bottom, is four times as high as wide, and has no top.

Let x be the width of the box. *[8 marks]*

a) Express the box's volume V in terms of the width of the box.



$$V = x \cdot x \cdot 4x$$

$$V = 4x^3$$

b) Express the box's surface area A in terms of the width of the box.

$$A = x^2 + 4 \cdot 4x^2$$

$$= x^2 + 16x^2$$

$$= 17x^2$$

c) You need to build a box that has a volume of 62.5 m^3. How much material do you need to build it, i.e. what is its surface area? Show all work.

$$V = 62.5$$

Solve $\quad 62.5 = 4x^3$

$$x^3 = 15.625$$

$$x = 2.5$$

And $\quad A = 17(2.5)^2 = 106.25 \text{ m}^2$