Quiz 1 - Algebra Review

Math 1030 - Dylan Zwick's Class

Fall 2007

Name: $\underline{Solutions}$

You have 30 minutes to take this exam. The exam is worth a total of 20 points. You are allowed to use your calculator if you'd like, but you may not use any textbooks, notes, or receive any outside help. Please note that to receive full credit you must put down enough work that I can follow your thinking. An answer with no work will not receive full credit.

1. *Fractions* (4 points)

   Simplify each of the following:

   (a) $3\left(\dfrac{2}{5}\right) - 7\left(\dfrac{1}{8}\right)$

   $$3\left(\frac{2}{5}\right) - 7\left(\frac{1}{8}\right) = \frac{3\cdot 2}{5} - \frac{7\cdot 1}{8} = \frac{6}{5} - \frac{7}{8}$$

   $$= \frac{48}{40} - \frac{35}{40} = \boxed{\frac{13}{40}}$$

   (b) $2\left(\dfrac{\left(5+\frac{3}{2}\right)}{4} - \dfrac{6}{5}\right)$

   $$= 2\left(\frac{\left(5+\frac{3}{2}\right)}{4} - \frac{6}{5}\right) = 2\left(\frac{\frac{10}{2}+\frac{3}{2}}{4} - \frac{6}{5}\right) = 2\left(\frac{\frac{13}{2}}{4} - \frac{6}{5}\right)$$

   $$= 2\left(\frac{13}{8} - \frac{6}{5}\right) = 2\left(\frac{65}{40} - \frac{48}{40}\right) = 2\left(\frac{17}{40}\right) = \boxed{\frac{17}{20}}$$

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2. *Percentages* (3 points)

A book normally sells for $20.00, but is currently on sale for 20% off. If sales tax on the book is 6%, how much would you pay in sales tax if you purchased the book?

$$\$20.00\,(1-.2) = \$20.00\,(.8) = \$16.00$$

$$(\$16.00)(.06) = \boxed{\$.96}$$

3. *Algebra* (4 points)

Solve for x in each of the following equations: (Please give all possible solutions, and there may be more than 1)

(a) $\dfrac{3-x}{2} = x + 5$

$$2\left(\frac{3-x}{2}\right) = (x+5)\,2$$

$$= \quad 3 - x \quad = \quad 2x + 10$$
$$\underline{\quad -10 + x \qquad\quad + x - 10 \quad}$$
$$-7 = 3x \qquad \Longrightarrow \qquad \boxed{x = -\frac{7}{3}}$$

(b) $x^2 + 2x - 4 = x + 8$

$$x^2 + 2x - 4 = x + 8$$
$$\quad\; -x \qquad\quad -x$$

$$\Rightarrow \quad x^2 + x - 4 = 8$$
$$\qquad\qquad -8 \quad -8$$

So,

$$\Rightarrow \quad x^2 + x - 12 = 0$$

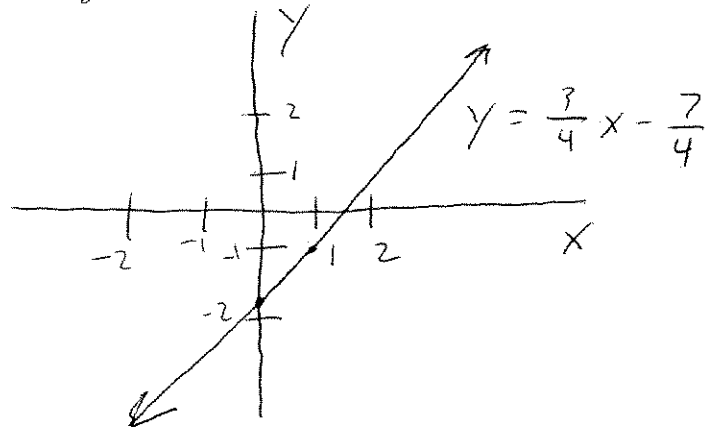$$\Rightarrow \quad (x+4)(x-3) = 0$$

$$\boxed{x = -4 \text{ or } x = 3}$$

4. *Graphing Linear Equations* (3 points)

Graph the following linear equation and give the slope and y-intercept of the line:

$$3x - 4y = 7$$

$3x - 4y = 7$

$\Rightarrow$ $\underline{+4y \quad +4y}$

$ 3x = 4y + 7$

$ \underline{-7 \qquad -7}$

$\Rightarrow \dfrac{3x - 7}{4} = \dfrac{4y}{4}$

$\Rightarrow \dfrac{3x-7}{4} = y \Rightarrow \boxed{y = \dfrac{3}{4}x - \dfrac{7}{4}}$

$\boxed{\begin{array}{l} slope = \dfrac{3}{4} \\ y\text{-intercept} = -\dfrac{7}{4} \end{array}}$

$y = \dfrac{3}{4}x - \dfrac{7}{4}$

5. *Simultaneous Equations* (4 points)

Find two positive numbers such that when you multiply them together you get 1, and the larger subtract the smaller also equals 1.

$xy = 1$

$x - y = 1$

$\Rightarrow x = 1 + y$

$\Rightarrow (1+y)y = 1$

$\Rightarrow y + y^2 = 1$

$\Rightarrow y^2 + y - 1 = 0$

Using the quadratic equation

$y = \dfrac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2(1)}$

$= \dfrac{-1 + \sqrt{5}}{2} = \boxed{-\dfrac{1}{2} + \dfrac{\sqrt{5}}{2}}$

We take the $+$ value as we want positive numbers

$x = 1 + y = \dfrac{2}{2} + \left(-\dfrac{1}{2} + \dfrac{\sqrt{5}}{2}\right)$

$= \boxed{\dfrac{1}{2} + \dfrac{\sqrt{5}}{2}}$

$\boxed{\begin{array}{l} x = \dfrac{1 + \sqrt{5}}{2} \\ y = \dfrac{-1 + \sqrt{5}}{2} \end{array}}$

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