Math 105-002
Homework 1

Name ANSWER KEY
Due by 4:00 pm, Thursday, September 10, 2009

Show all work neatly. Put your answers in boxes.

1. Find all real solutions to each of the following equations:

a) $x^2 - 5x + 2 = 0$ Does not factor. Use quadratic formula: $a=1, b=-5, c=2$ — 2 pts.

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(2)}}{2(1)} = \frac{5 \pm \sqrt{25-8}}{2} = \boxed{\frac{5 \pm \sqrt{17}}{2}}$$

b) $6x(x-1) = 21 - x$ Expand & combine like terms: $6x^2 - 6x = 21 - x$; $6x^2 - 5x - 21 = 0$

I. Solve by factoring: — 2 pts.

$6x^2 - 5x - 21 = (2x+3)(3x-7) = 0$

Let $2x+3=0$ $\quad 3x-7=0$

$2x = -3 \quad 3x = 7$

$\boxed{x = -3/2 \text{ or } x = 7/3}$

II. Use quadratic formula: (or to stop here)

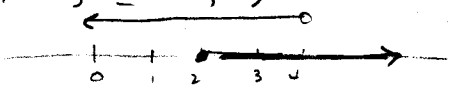
$$x = \frac{5 \pm \sqrt{25 - 4(6)(-21)}}{2 \cdot 6} = \frac{5 \pm \sqrt{25+504}}{12} = \frac{5 \pm \sqrt{529}}{12}$$

$$= \frac{5 \pm 23}{12} \rightarrow \frac{28}{12} = \frac{7}{3}$$

$$\searrow \frac{-18}{12} = -3/2$$

2. Let $A = \{x \mid x \geq 2\}$ and $B = \{x \mid x < 4\}$. Find the following:

a) $A \cap B = \{x \mid 2 \leq x < 4\}$ or $[2, 4)$ — 1 pt



b) $A \cup B = \mathbb{R}$ or $(-\infty, +\infty)$ or $\{x \mid x \in \mathbb{R}\}$ or $\{x \mid -\infty < x < +\infty\}$ — 1 pt.

3. Solve the equation: $|x+5| = 2$ — 2 pts.

split → $x+5 = 2 \quad x+5 = -2$

$\boxed{x = -3 \quad x = -7}$

4. Solve the inequalities:

a) $4 < 3x - 5 < 13$ — 2 pts.

$+5 \quad +5 \quad +5$

$9 < 3x < 18$

$\frac{9}{3} < \frac{3x}{3} < \frac{18}{3}$

$\boxed{3 < x < 6}$

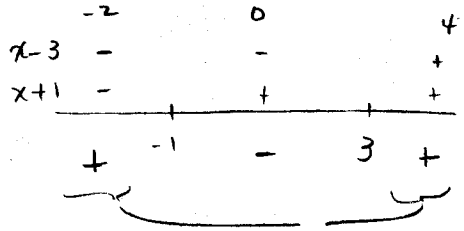
b) $x^2 \geq 2x + 3$ — 3 pts.

$x^2 - 2x - 3 \geq 0$

Let $x^2 - 2x - 3 = 0$

$(x-3)(x+1) = 0$

$\rightarrow x = 3 \quad x = -1$ — Endpts of intervals — 1 pt.



Need + intervals, because $x^2 - 2x - 3 \geq 0$

solution: $\{x \mid x \leq -1 \text{ or } x \geq 3\}$ or

$(-\infty, -1] \cup [3, +\infty)$