Name: Key

Take-Home Quiz 3

Math 121 College Algebra – Crawford

Due: Friday, 17 March 2017 beginning of class

Books, notes, and calculators *are* allowed. You <u>are</u> allowed to work with each other and to get help from the tutors, but you cannot get help from me. ***You must show all your work.*** Good luck! [Scores will be scaled to 15 points after grading.]

For spacing reasons, the Section 1.7 problems are on page 2 and the Section 1.8 problems are on page 1.

1. (6 pts) Solve the following inequality. Then graph the solution set.

$3x^3 + 9x^2 > 0$

$3x^2(x+3) > 0$ ★ True when positive

Key Values:

$3x^2 = 0$ or $x+3=0$

$x^2 = 0$ $\quad x = -3$

$x = 0$

Test in ★

(+)(−)	(+)(+)	(+)(+)
−	+	+

−3 0 x

$x = -10$ $\quad x = -1$ $\quad x = 10$

$(-3, 0) \cup (0, \infty)$

2. (6 pts) Solve the following inequality. Then graph the solution set.

$\frac{3}{x-2} \geq \frac{2}{x}$

$\frac{3}{x-2} - \frac{2}{x} \geq 0$

Cross-mult: $\frac{3x - 2(x-2)}{x(x-2)} \geq 0$

$\frac{3x - 2x + 4}{x(x-2)} \geq 0$

$\frac{x+4}{x(x-2)} \geq 0$ ★ True when positive or equal to 0.

Key Values: Equal 0

$x+4=0$

$x=-4$

Undefined

$x(x-2)=0$

$x=0$ or $x-2=0$

$x=2$

Testing ★

(−)(−)	(+)(−)	(+)(+)	(+)(+)
+	−	+	+

−4 0 2

$x=-10$ $\quad x=-1$ $\quad x=1$ $\quad x=10$

$[-4, 0) \cup (2, \infty)$

3. (6 pts) Solve the following inequality. Then graph the solution set.

$2x + 5 < \dfrac{8x+1}{3}$

$3(2x+5) < \left(\dfrac{8x+1}{3}\right) \cdot 3$

$6x + 15 < 8x + 1$

$-8x \quad -8x$

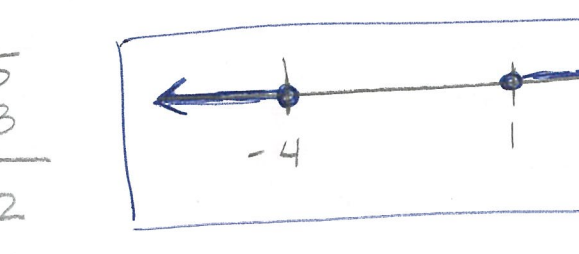
$-2x + 15 < 1$

$-15 \quad -15$

$-2x < -14$

$\dfrac{-2x}{-2} > \dfrac{-14}{-2}$

$x > 7$



4. (6 pts) Solve the following inequality. Then graph the solution set.

$|3 + 2x| \geq 5$

or

$3 + 2x \leq -5$

$-3 \quad -3$

$2x \leq -8$

$x \leq -\dfrac{8}{2}$

$3 + 2x \geq 5$

$-3 \quad -3$

$2x \geq 2$

$x \geq \dfrac{2}{2}$

$x \leq -4$ or $x \geq 1$

$(-\infty, -4] \cup [1, \infty)$

5. (6 pts) The average salaries S (***in thousands of dollars***) for public elementary school teachers in the United States from 2001 through 2011 can be modeled by the following equation where t represents the year, with $t = 1$ corresponding to 2001. According to this model, when was the average salary at least \$52.000, but no more than \$56.000? [Give your answer in terms of t and the actual years.]

$S = 56$

$S = 52$

$S = 1.36t + 41.1, \quad 1 \leq t \leq 11$

$52 \leq 1.36t + 41.1 \leq 56$

$-41.1 \quad -41.1 \quad -41.1$

$10.9 \leq 1.36t \leq 14.9$

$\dfrac{10.9}{1.36} \leq \dfrac{1.36t}{1.36} \leq \dfrac{14.9}{1.36}$

$8.01 \leq t \leq 10.96$

Between 2008 and the end of 2010