Name: _____ Date: _____

QUADRATIC INEQUALITIES IN ONE VARIABLE
ALGEBRA 2 WITH TRIGONOMETRY

At the heart of solving any inequality is finding all values of the variable (or variables) that make the inequality true. This basic notion of inequalities is critical to understand before proceeding.

***Exercise* #1:** Determine if each of the following is a solution to the inequality given. Show work to justify your response.

(a) $x^2 - 3x - 10 > 0$ for $x = 4$ (b) $2x^2 + 13x - 7 \geq 0$ for $x = 2$ (c) $x^2 - x - 12 < 0$ for $x = -3$

Most of the time, there are an infinite number of solutions to an inequality. The **solution set** of inequalities like these cannot be written in **roster form** (where one lists the solutions). In *Exercise* #2, we will explore how to determine this solution set by using tables on your calculator.

***Exercise* #3:** Consider the quadratic inequality $x^2 + 2x - 3 < 0$.

(a) Solve the corresponding equation $x^2 + 2x - 3 = 0$ algebraically for all values of *x*.

(b) Using your calculator and the equation $y = x^2 + 2x - 3$ fill in the table below.

x	-5	-4	-3	-2	-1	0	1	2	3
y									

(c) Explain why the zero's you found in part (a) are **not** part of the solution set of the inequality.

(d) Write the solution set of the inequality using set-builder notation and represent it on a number line.

The key to algebraically solving a quadratic inequality is to first find the zeros and then test points between the zero's and outside the zeros.

***Exercise* #3:** Which of the following is the solution set of the inequality $x^2 - 4 > 0$?

(1) $\{x \mid x > 2\}$ (3) $\{x \mid x > 2 \text{ or } x < -2\}$

(2) $\{x \mid -2 < x < 2\}$ (4) $\{x \mid x > -2\}$

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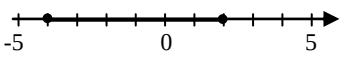
***Exercise* #4:** Solve each of the following quadratic inequalities. Write you final answers in set-builder notation and represent the solution set on a number line.

(a) $x^2 - 5x - 36 \le 0$

(b) $5x^2 + 28x - 12 > 0$

(c) $2x^2 - 4x - 8 \ge 10x - 8$

(d) $x^2 + 14x - 6 < 14x + 19$

***Exercise* #5:** The number line graph 

is the solution to which of the following inequalities?

(1) $x^2 - 2x - 8 > 0$

(3) $x^2 - 2x - 8 \ge 0$

(2) $x^2 + 2x - 8 < 0$

(4) $x^2 + 2x - 8 \le 0$

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***Exercise* #6:** Which of the following represents the solution set of the inequality $-2x^2 + 7x - 3 > 0$?

(1) $\left\{x \mid \frac{1}{2} < x < 3\right\}$

(3) $\left\{x \mid x < -3 \text{ or } x > \frac{1}{2}\right\}$

(2) $\left\{x \mid -\frac{1}{2} < x < 3\right\}$

(4) $\left\{x \mid x < \frac{1}{2} \text{ or } x > 3\right\}$

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QUADRATIC INEQUALITIES IN ONE VARIABLE
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Which of the following values of x is in the solution set of the inequality $x^2 + x - 2 > 0$? Hint – to make this problem easier, generate a table on your calculator using $y = x^2 + x - 2$.

   (1) 1 (3) 0

   (2) -2 (4) -4 _____

2. Which of the following values of x is *not* in the solution set of the inequality $5x^2 + 35x \le 0$?

   (1) -1 (3) 0

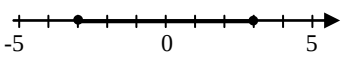
   (2) 2 (3) -7 _____

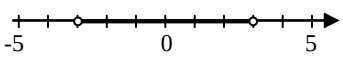
3. The solution set of the inequality $x^2 > 25$ is which of the following?

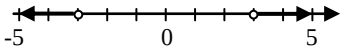
   (1) $(5, \infty)$ (3) $(-\infty, -5) \cup (5, \infty)$

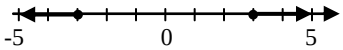
   (2) $[-5, 5]$ (4) $(-\infty, 5]$ _____

4. The solution to the inequality $x^2 - 9 < 0$ can be expressed graphically as

   (1) 

   (3) 

   (2) 

   (4) 

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5. Which of the following is the solution set of $(x+5)(x-3) < 0$?

   (1) $\{x \mid -5 < x < 3\}$ (3) $\{x \mid x < -5 \text{ or } x > 3\}$

   (2) $\{x \mid -5 \le x \le 3\}$ (4) $\{x \mid -3 < x < 5\}$ _____

6. Which inequality below represents all solutions to $x^2 \ge 5x + 24$?

   (1) $\{x \mid -6 \le x \le 4\}$ (3) $\{x \mid x \le -8 \text{ or } x \ge 3\}$

   (2) $\{x \mid -2 \le x \le 12\}$ (4) $\{x \mid x \le -3 \text{ or } x \ge 8\}$ _____

7. Find the solution set to each of the quadratic inequalities shown below. Represent your solution set both in set-builder notation and graphically on a number line.

(a) $2x^2 + 9x - 35 < 0$

(b) $x^2 \geq 5x + 6$

(c) $8x^2 + 50x - 5 < 10x - 5$

(d) $4x^2 + 23x - 6 \geq 0$

(e) $x^2 \leq 10x + 24$

(f) $7x^2 + 4x + 3 > 3x^2 + 4x + 4$