Name:________________________________

MATH 150: QUIZ 9 (3.5)

1. Solve the inequality
$$x^2 - x - 12 \leq 0.$$
Express your answer in interval notation.

2. Solve the inequality
$$-2x^2 > -11x + 15.$$
Express your answer in interval notation.

3. Solve the inequality
$$3x^2 + 6x > 45.$$
Express your answer in interval notation.

Solutions

1. First we compute the roots. This quadratic we can factor by inspection as $(x-4)(x+3)$ so the roots are -3 and 4. Since the leading coefficient is positive, we get the following sign chart.

$$\begin{array}{ccccc} + & & - & & + \\ \hline & -3 & & 4 & \end{array}$$

   Given that we want to solve

$$x^2 - x - 12 \leq 0,$$

   the solution is $[-3, 4]$.

2. This is equivalent to solving

$$0 > 2x^2 - 11x + 15.$$

   First we find the roots. This time, let's use quadratic formula. We have $a = 2, b = -11, c = 15$. The discriminant is

$$d = b^2 - 4ac = (-11)^2 - 4(2)(15) = 1.$$

   The roots are

$$\frac{-b \pm \sqrt{d}}{2a} = \frac{-(-11) \pm \sqrt{1}}{2(2)} = 3, \ \frac{5}{2}$$

   Since the leading coefficient is positive, we get the following sign chart.

$$\begin{array}{ccccc} + & & - & & + \\ \hline & \frac{5}{2} & & 3 & \end{array}$$

   This gives that the solution is $\left(\frac{5}{2}, 3\right)$.

3. Solving this inequality is equivalent to solving

$$3x^2 + 6x - 45 > 0,$$

   which is equivalent (by dividing by 3) to solving

$$x^2 + 2x - 15 > 0.$$

   We factor by inspection to get $(x+5)(x-3)$, which yields roots -5 and 3. This gives the following sign chart.

$$\begin{array}{ccccc} + & & - & & + \\ \hline & -5 & & 3 & \end{array}$$

   That gives the solution $(-\infty, -5) \cup (3, \infty)$.