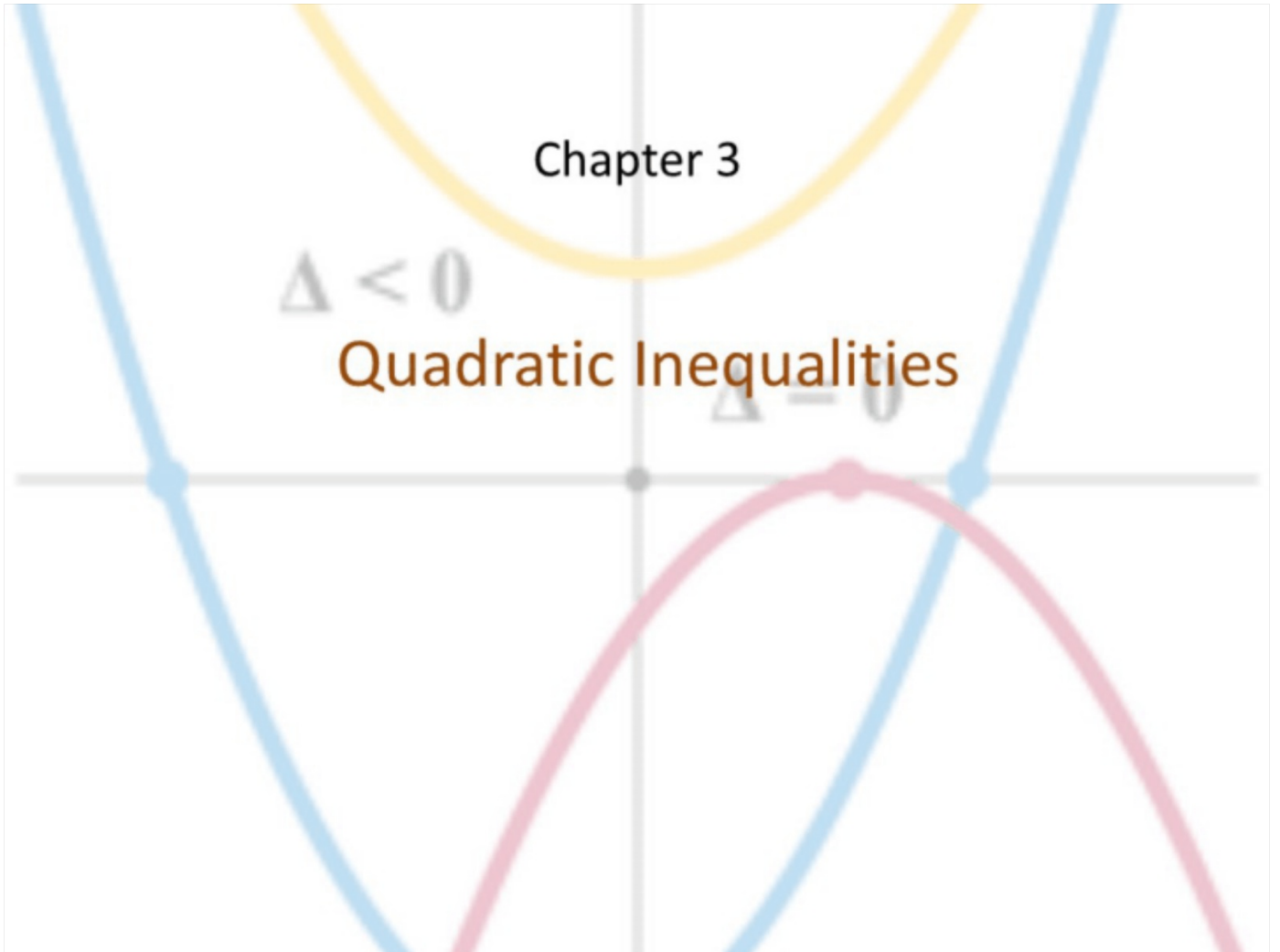


Chapter 3

$\Delta < 0$

Quadratic Inequalities

$\Delta = 0$



## Objective

Students will...

- Be able to use factoring and/or inverse operations to solve quadratic inequalities.

## Quadratic Equations

Remember that we can solve quadratic equations (i.e. find the x-intercepts) by factoring.

Ex.  $3 = x^2 - 6$   
 $+6$                        $+6$   
 $\sqrt{9} = x$

$\pm 3 = x$

Ex.  $-3 = x^2 - 4x$   
 $+3$                        $+3$   
 $0 = x^2 - 4x + 3$   
 $0 = (x-3)(x-1)$   
 $+3$                        $+1$

$x = 3, 1$

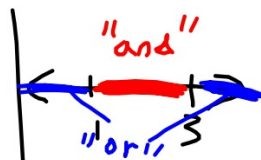
~~$\begin{array}{r} 3 \\ -3 \end{array} \begin{array}{r} -1 \\ -4 \end{array}$~~

## Solving Quadratic Inequalities

As we have learned by now, we can solve inequalities by using the same properties that we use to solve equations. Unfortunately, quadratic inequalities require a bit more steps to finish.

Ex.  $3 > x^2 - 6$   
 $\begin{matrix} +6 & +6 \\ \sqrt{9} & > \sqrt{x^2} \end{matrix}$

$x < 3, x > -3$



~~$-3 \leq x \leq 3$~~   
 $x \leq -3 \text{ or } x \geq 3$

Ex.  $-3 \leq x^2 - 4x + 3$   
 $0 \leq x^2 - 4x + 3$

$0 \leq (x-1)(x-3)$

$0 \leq \begin{matrix} (2-1)(2-3) \\ + \cdot - \\ = - \end{matrix}$

~~$\begin{matrix} 3 \\ -1 & -3 \\ -4 \end{matrix}$~~

**Note:** To sum up, we need to simply test a number in between our two solutions. If it satisfies the inequality, then we it's "and." If not, it is "or."

## Examples

$$\text{a. } (x+1)(x-2) > 0$$

$-1 \quad +2$

~~$x < -2$~~   $(0+1)(0-2) \neq 0$

$+ \quad \bullet \quad -$   
 $-$

$x < -1, x > 2$

$$\text{b. } (x-1)^2 \leq -2$$

No Sol.

## Examples

$$c. \frac{-6x^2}{-1} + \frac{5x}{-1} - \frac{1}{-1} \geq 0$$

$$6x^2 - 5x + 1 \leq 0$$

$$6 \cdot 1 \quad (2x-1)(3x-1) \leq 0$$

$$\begin{array}{ccc} 6 & +\frac{1}{2} & +\frac{1}{3} \\ \hline -3 & 0.5 & 0.333 \\ \hline -5 & \frac{2}{6} = -\frac{1}{3} & \end{array}$$

$$\boxed{\frac{1}{3} \leq x \leq \frac{1}{2}}$$

$$\cancel{x \leq \frac{1}{3} \text{ or } x \geq \frac{1}{2}}$$

$$d. 3x^2 - 10x + 12 \leq 7x + 2$$

$$3x^2 - 17x + 10 \leq 0$$

$$(x-5)(3x-2) \leq 0$$

$$\boxed{\frac{2}{3} \leq x \leq 5}$$

$$\cancel{x \leq \frac{2}{3} \text{ or } x \geq 5}$$

Homework Due 11/5

**Solving Quadratic Inequalities WKSHT**