

# Chapter 2.7: Polynomial and Rational Inequalities

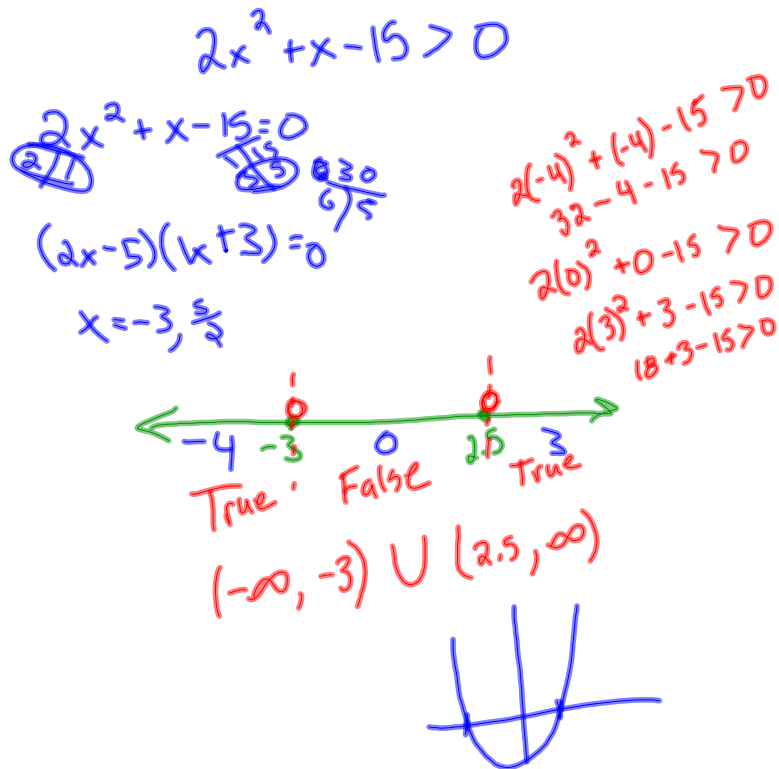
A polynomial inequality is any inequality that can be put in one of the forms where  $f$  is a polynomial function

$$f(x) > 0 \quad f(x) < 0 \quad f(x) \leq 0 \quad f(x) \geq 0$$

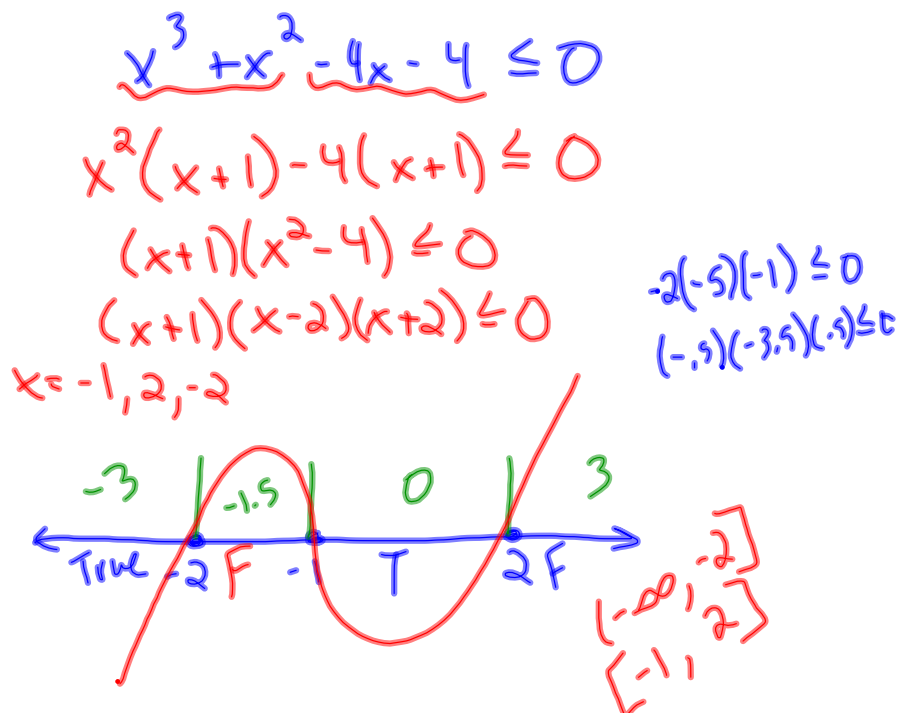
## Solving Polynomial Inequalities:

1. set the inequality to 0
2. Find the zeros, focus on the real zeros
3. graph on a number line
4. pick a test point in the interval
5. write the solution set

ex. solve and graph the solution set  
on a real number line:  $2x^2+x>15$



Solve and graph the solutions set  
on a real number line:  $x^3+x^2 \leq 4x+4$



Rational inequalities are in the same form but  $f$  is a rational function.

- the process to solve is similar except our intervals are determined by the zeros of the numerator and denominator.

Solve and graph the solution set:  $\frac{x+1}{x+3} \geq 2$

$$\frac{x+1}{x+3} - 2 \geq 0$$

$$\frac{1}{3} \geq 2$$

$$\frac{x+1 - 2(x+3)}{x+3} \geq 0$$

$$\frac{-3}{-1} \geq 2$$

$$\frac{-5}{-3} \geq 2$$

$$\frac{x+1-2x-6}{x+3} \geq 0$$

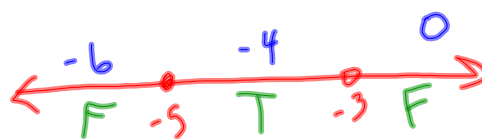
$$-x-5 = 0$$

$$x = -5$$

$$x+3 = 0$$

$$x = -3$$

$$\frac{-x-5}{x+3} \geq 0$$



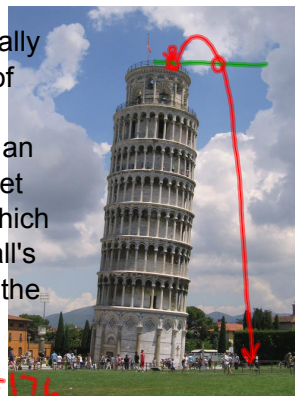
$$[-5, -3)$$

# Free Falling Object Equation:

$$s(t) = -16t^2 + v_0t + s_0$$

height after t seconds      initial velocity      initial height

A ball is thrown vertically upward from the top of the Leaning Tower of Pisa (176 ft high) with an initial velocity of 96 feet per second. During which time period will the ball's height exceed that of the tower?

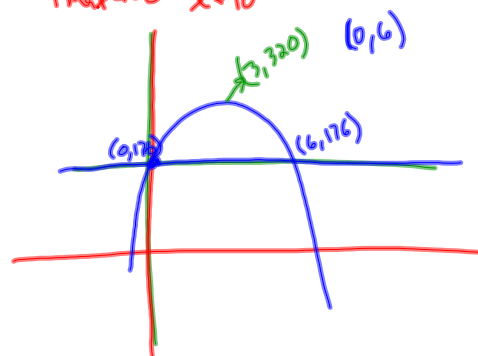


$$h(t) = -16t^2 + 96t + 176$$

$$-16t^2 + 96t + 176 > 176$$

$$y_{\min} 0 \quad x = -5$$

$$y_{\max} 200 \quad x = 10$$



Suggested Homework: Ch 2.7 pg.334  
#'s 3,9,21,33,37,41,45,49,51