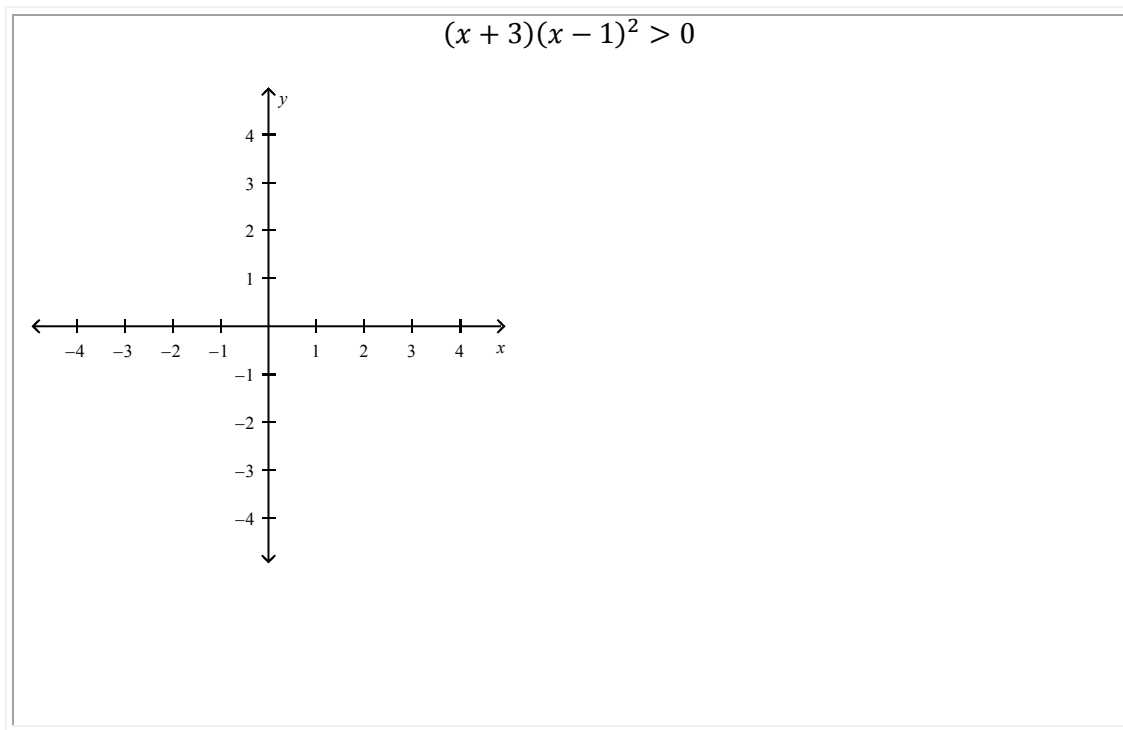


**Precalculus**  
**Lesson 4.6: Polynomial and Rational Inequalities**  
**Mrs. Snow, Instructor**

This section covers the processes to graph inequalities of polynomials of a 3<sup>rd</sup> degree or greater. Graphically, we are able to visually see where the function is greater or less than 0. However, we also need to demonstrate how to solve an inequality algebraically.

Solve inequality graphically:

1. Graph and identify the zeros of the function written as an equality.
2. For rational functions, determine the intervals of  $x$  such that the graph is above/below the  $x$ -axis
3. From the graph you can see where the  $f(x)$  is  $>$  or  $<$  0



**Algebraic solution**

1. Write the inequality so that a polynomial/rational expression is on the left side and 0 is on the right side
2. Determine the real zeros ( $x$ -intercepts) of  $f$ . Rational: real numbers for which the expression is undefined.
3. Using the zeros divide the real number line into intervals
  - a. Is the inequality  $<$ ,  $>$ ,  $\leq$ , or  $\geq$  at zero?
  - b. Equality means a point on the zero
  - c. No equal means a circle
4. Select a number in each interval, evaluate at that number. Focus on the sign of the factors and the overall outcome of  $\pm$ . Don't worry about the exact numerical answer.

Solve the inequalities algebraically and graph the solution

$$x^4 > x$$

$$\frac{4x + 5}{x + 2} \geq 3$$