**Math 1050 ~ College Algebra**

### 11 Polynomial Inequalities

#### Learning Objectives
- Solve polynomial inequalities graphically.
- Solve polynomial inequalities analytically.

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**Graphical Interpretations of Equations and Inequalities**

Ex 1: Given this graph of \(f(x)\) and \(g(x)\), determine the values of \(x\) for which each of these is true.

- a) \(f(x) = g(x)\)
- b) \(f(x) < g(x)\)
- c) \(f(x) > g(x)\)

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**Analytical Solution of Polynomial Inequalities**

Ex 2: Given \(f(x) = x^2 - 4\) and \(g(x) = x + 2\), determine the values of \(x\) for which each of these is true by doing the math.

- a) \(f(x) = g(x)\)
- b) \(f(x) < g(x)\)
- c) \(f(x) > g(x)\)
As the functions get more complicated, it is convenient to use a **sign line** to sort it out.

**Directions for Using a Sign Line**

a) Write the inequality as a function, \( f \), with zero on the right side.
b) Determine the zeros of \( f \) and place them on a number line.
c) Choose a test value in each of the intervals on the number line.
d) Determine the sign of \( f \) for each test value, writing that sign above that interval.
e) Your solution is the interval(s) that correspond to the inequality.

Ex 3: Follow the steps above to solve these inequalities.

a) \( x^2 + 2x > 3 \)  
b) \( -3x^2 - 2x \geq -x^2 + x - 2 \)

Ex 4: Solve this inequality by each method.

a) Graphically \( (x-1)^2 - 2 > -x^2 + 3 \)  
b) Analytically \( (x-1)^2 - 2 > -x^2 + 3 \)