

*"He who learns but does not think, is lost!  
He who thinks but does not learn is in great danger."  
-Confucius*

Recall from last time the following identities:

- (1) Difference of Squares:  $a^2 - b^2 = (a + b)(a - b)$
- (2) Difference of Cubes:  $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- (3) Sum of Cubes:  $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- (4)  $(a + b)^2 = a^2 + 2ab + b^2$
- (5)  $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

Solve using the key number method. Write the solution in interval notation.

1.  $(x + 2)(x - 3) > 0$

**Solution:**  $(-\infty, -1) \cup (3, \infty)$

2.  $x^2 - 9 \leq 0$

**Solution:**  $[-3, 3]$

3.  $(x - 1)(x + 4)(2x + 1) \geq 0$

**Solution:**  $[-4, -\frac{1}{2}] \cup [1, \infty)$

4.  $x(x + 1) \leq 2$

**Solution:**  $[-2, 1]$

5.  $\frac{x(x - 1)}{(x + 3)(x + 5)} \geq 0$

**Solution:**  $(-\infty, -5) \cup (-3, 0] \cup [1, \infty)$

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

**Solution:**  $(-1, 1) \cup (2, 3)$

7.  $\frac{x}{x + 1} > 1$

**Solution:**  $(-\infty, -1)$

8.  $x + \frac{3}{x - 1} \leq 5$   $(-\infty, 1) \cup [2, 4]$