Section 3: Polynomial Equations and Factoring

Why factor?
Consider the following problem. Suppose that a baseball is thrown upward. Its height, \( h(t) \) in feet, after \( t \) seconds is given by
\[ h(t) = -16t^2 + 68t. \]

Thus, the ball hits the ground after \( \) seconds.

We need an algebraic method to answer the question of when the ball hits the ground. In fact, we need to know how to factor.

We just solved the equation \(-16t^2 + 68t = 0\). Now graph the function \( y = -16t^2 + 68t \). Use the window: \([-1, 5, 1, -20, 80, 10]\).

What is the degree of \( y = -16t^2 + 68t \)? This graph could cross the \( x \)-axis \( \) times.

The values of \( t \) which make \( y = f(t) = 0 \) are called zeros.

The zeros of the function are \( \) and \( 4.25 \) sec

NOTE: \( x \)-intercepts \( = \) \( (0,0), (4.25,0) \)

List of factoring techniques
1. Factoring Technique #1: Factor out common factors
   Example: \( 4t^3 - 8 = \)

   Factor completely:
   a.) \( 10p^3q - 4p^2q^2 - 2pq^3 = \)
   b.) \( 4x - 24 = \)
c.) \(-x^2 + 5x =

d.) \((a - b)x + 5) + (a - b)(x + y) =

e.) \((x + 7)(y + 2) - 4(x + 7) -

II. Factoring Technique #2: Factor by Grouping

Example: \(t^2 + 3t^2 + 4t + 12 -

Factor completely:

a.) \(4x^2 - 15 + 20x^2 - 3x =

b.) \(t^2 + 6t^2 - 2t - 12 -

Solve:

a.) \(-16t^2 + 64t - 0

b.) 2x - 4x^2 = 0

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