Factoring

MATH 1511, BCIT

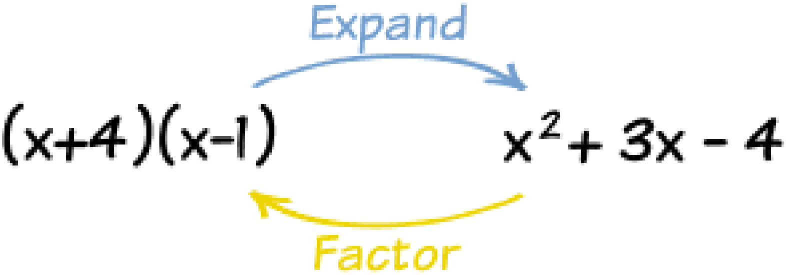
Technical Mathematics for Geomatics

October 11, 2017

In this unit, we will address three types of factoring.

1. Common Terms
2. Difference of Squares
3. Quadratic Equation

The idea is to be skilled in both directions, factoring and expanding.



Common Terms

Factor out the common terms and simplify.

$$3x - 6x^2 \tag{1}$$

$$3x^2y - 6x^2y \tag{2}$$

$$\frac{80p^3 - 60pq^3}{80pq} \tag{3}$$

$$\frac{80p^3 - 60pq^3}{80 + pq} \tag{4}$$

Difference of Squares

Always have the following three identities at your fingertips.

$$a^2 - b^2 = (a - b)(a + b) \tag{5}$$

$$(a + b)^2 = a^2 + 2ab + b^2 \tag{6}$$

$$(a - b)^2 = a^2 - 2ab + b^2 \tag{7}$$

Difference of Squares Exercises

Factor the following expressions,

$$x^2 - 4 \tag{8}$$

$$49 - P^4 \tag{9}$$

$$12 - t^2 \tag{10}$$

$$5q^3 - 125q \tag{11}$$

$$28x^2 - 700y^2 \tag{12}$$

$$r^8 - 1 \tag{13}$$

When we learned about quadratic equations, we found that completing the square will give us the solution to a quadratic equation. Consider the equation $2x^2 - 5x - 3 = 0$.

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$$=$$
$$(2x \qquad)(x \qquad)$$

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$$\left(2x \begin{matrix} +3 \\ -3 \\ +1 \\ -1 \end{matrix}\right)\left(x \begin{matrix} +3 \\ -3 \\ +1 \\ -1 \end{matrix}\right)$$

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$$x=-\frac{1}{2}$$

$$x-3=0$$
$$x=3$$

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$$2x+1=0 \qquad\qquad x-3=0$$

$$x=-\frac{1}{2} \qquad\qquad x=3$$

$$S=\left\{-\frac{1}{2}, 3\right\}$$

Quadratic Equations II

Now that we want to factor a quadratic polynomial we could use the reverse procedure to find the factors. Instead of completing the square to find the solutions we could use the quadratic formula in order to find out how to complete the square.

$$2x^2 - 5x - 3 = 0 \tag{14}$$

$$x_{1,2} = \frac{5 \pm \sqrt{25 - 4 \cdot 2 \cdot (-3)}}{2 \cdot 2} \tag{15}$$

$$S = \left\{ -\frac{1}{2}, 3 \right\} \tag{16}$$

$$2x^2 - 5x - 3 = 2 \cdot (x - x_1)(x - x_2) = (2x + 1)(x - 3) \tag{17}$$

Simplify.

$$\frac{3x-6}{5x}\cdot\frac{x^2-x-6}{x^2-4} \tag{18}$$

$$\frac{9x^2-25}{2x-2}\cdot\frac{1-x^2}{6x-10} \tag{19}$$

$$\frac{x}{x^2-7x+6}-\frac{x}{x^2-2x-24} \tag{20}$$

$$\frac{x}{(x-1)^2}+\frac{2}{x}-\frac{x+1}{x^3-x^2} \tag{21}$$

$$\frac{1}{h}\left(\frac{1}{(x+h)^2}-\frac{1}{x^2}\right) \tag{22}$$

End of Lesson

Next Lesson: Radians.