Section 4.1 Polynomial Functions

Polynomial functions with a single variable and three or more terms will be the topic of our study.

If we define a polynomial in one value, x, the expression is defined as: $P(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots a_2 x^2 + a_1 x + a_0$ where a_n, a_{n-1}, a_2, a_1, and a_0 represent complex numbers, $a_n \neq 0$, and n represents a nonnegative integer. These values are coefficients and a_n is the leading coefficient. The largest exponent on the variable represents the degree of the polynomial.

Ex. $5x^4 - 2x^3 + 6x - 4$ is a polynomial with a lead coefficient of 5 and a degree of 4.

For each polynomial, there exists values for the variable, x, that cause the polynomial to equal zero. These values of x are called the zeros of the function.

Zero values of functions, roots, are complex numbers.

Complex number can be real and/or imaginary.

Imaginary numbers are based on $\sqrt{-1} = i$.

We see that $\sqrt{-1} = i$, $i^2 = -1$, $i^3 = -\sqrt{i}$, $i^4 = 1$.

Imaginary numbers that exist as roots of a polynomial always come in pairs that are called conjugate pairs. $a+bi$; $a-bi$ a and b are real numbers and i is an imaginary number.

Ex. $6+2i$; $6-2i$