# Chapter 2 – Polynomial and Rational Expressions

## 2.1: Adding and Subtracting Polynomials

**Defn 2.1.1** many term

A **POLYNOMIAL** is a mathematical expression constructed by combining (through addition/subtraction) **POWER FUNCTIONS**. The polynomial is (usually) written in decreasing order (degree) of the power functions (and no "power" has more than one "term").

**Defn 2.1.2**

A **POWER FUNCTION** is of the form $y = c \cdot x^n$ where "*n*" is the power, and "*c*" is a real number (though we will mostly see integers) called the coefficient.

e.g. of a power Function

$f(x) = 2x^5$

e.g.'s of Polynomial Expressions:

$2x^2 - 5x - 3$ ← order 2 power "in"; order 1 power "in"; order 0 power "in" ($0$ $x$'s)

order 2 expression (take the highest power)

One word that requires a closer look: **TERM**

**Defn 2.1.3**

In any expression a **TERM** is constructed by multiplying **FACTORS** together. Terms are separated from each other by addition and subtraction. Polynomials contain "many terms" (in fact "polynomial" literally means "many terms".) The terms of a polynomial expression are all power functions. (We will look at this again!)

Two power functions are called "like terms" if they have the same order/degree/power (but they certainly can have different coefficients!).

e.g.: order 5

$3x^2y^3$ & $-\pi x^2y^3$ are like terms

but $5x^3y^2$ is not like the others

When simplifying and adding/subtracting polynomial expressions we combine like terms by adding/subtracting the coefficients of the like terms.

**Example 2.1.1**

a) Simplify: $(4x^2 - 5x^3 - 5) + (2x^3 - 4x + 2)$

$= -3x^3 + 4x^2 - 4x - 3$

b) Subtract $4x^2 - 3x + 1$ from $6x^2 + x$

$(6x^2 + x) - (4x^2 - 3x + 1) = 6x^2 + x - 4x^2 + 3x - 1$

$= 2x^2 + 4x - 1$

Final Note: Polynomial Expressions (or functions too) are considered equivalent if they contain exactly the same terms. So, you can tell if two expressions are equivalent just by looking at them to see if they contain the same terms…OR we can tell that two mathematical objects are equivalent if they have no difference (eg. The objects *a* and *b* are equivalent if $a - b = 0$)

$1 - 0.\dot{9} = 0$

**Class/Homework**

**Section 2.1**

1) Read Example 3 on page 87
2) Pg 88 – 89 #4bdf, 5ace, 6acef, 7, 10 – 12
3) For the adventurous: Pg. 90 # 15, 16