

## 5.2 – Polynomials & Long Division

Just as we performed long division with numbers, we can also perform long division with polynomials.

A) Dividing a polynomial by a monomial.

Ex: Simplify.  $\frac{6x^4y^3 + 12x^3y^2 - 18x^2y}{3xy}$

1.  $\frac{20c^4d^2f - 16cdf^2 + 4cdf}{4cdf}$

B) Dividing a polynomial by a binomial.

Ex:  $(2x^3 + 3x^2 - 4x + 15) \div (x + 3)$

1.  $(3x^3 - 8x^2 + 11x - 14) \div (x - 2)$

Ex.  $(15x^2 + 8x + 1) \div (3x + 1)$

2.  $(2x^2 + 3x - 20) \div (2x - 5)$

**C) Inserting zero-place holders for any missing exponents.**

**Ex:**  $(2x^3 - 3x^2 - 80) \div (x - 4)$

**3.**  $(3x^3 - 14x - 39) \div (x - 3)$

**D) Remainders**

**Ex.**  $(15x^2 + 8x + 12) \div (3x + 1)$

**4.**  $(a^3 + 2a^2 - 9) \div (a - 2)$

**E) Divisor with a degree greater than one.**

**Ex:**  $(r^3 + 4r^2 - r - 9) \div (r^2 - 1)$

**5.**  $(x^3 - 3x^2 + x + 7) \div (x^2 + 1)$

**Long Division is not limited to dividing only by a binomial.**

**Ex.**  $(x^3 - 2x^2 - 9x + 18) \div (x^2 - 5x + 6)$