

Notes - Math 3

2-2

Multiplying Polynomials

I. Monomial  $\times$  Polynomial

Use the distributive property:  $a(b+c+d) = ab + ac + ad$

$$\begin{aligned} x(3x^2 - 4x + 2) \\ 3x^3 - 4x^2 + 2x \end{aligned}$$

$$\begin{aligned} 2ab^2(3a^2 - 4ab) \\ 6a^3b^2 - 8a^2b^3 \end{aligned}$$

$$\begin{aligned} -3x^2 \left( x^3 - 4x^2 + \frac{1}{3}x \right) \\ -3x^5 + 12x^4 - x^3 \end{aligned}$$

$$\begin{aligned} -2a(a^2 - 4a + 4) \\ -2a^3 + 8a^2 - 8a \end{aligned}$$

## II. Polynomial x Polynomial

A. Binomial x Binomial use FOIL

$$(x+3)(x+7)$$

$$x^2 + \underline{7x+3x} + 21$$

$$x^2 + 10x + 21$$

$$(a-5)(a+12)$$

$$a^2 + 7a - 60$$

$$(4x-1)(2x+3)$$

$$(4x-1)(2x+3) \\ 8x^2 + 12x - 2x - 3$$

$$8x^2 + 10x - 3$$

$$(x^2+3)(x+6)$$

$$x^3 + 6x^2 + 3x + 18$$

$$(2a+1)(2a-1) \text{ 'conjugate'}$$

$$4a^2 - \cancel{2a} + \cancel{2a} - 1$$

$$4a^2 - 1$$

To square a binomial, write it twice and use FOIL.

$$\begin{aligned}(x-4)^2 \\ (x-4)(x-4) \\ x^2 - 4x - 4x + 16 \\ x^2 - 8x + 16\end{aligned}$$

$$\begin{aligned}(3a-4b)^2 \\ (3a-4b)(3a-4b) \\ 9a^2 - 12ab - 12ba + 16b^2 \\ \quad \quad \quad \underline{-12ab} \\ 9a^2 - 24ab + 16b^2\end{aligned}$$

B. Trinomial x Binomial

Use the Distributive Property:

Take each term of the 1st polynomial and multiply it to the whole 2nd polynomial. Then distribute again.

$$\begin{aligned}(a^2 + 3a + 2)(a-1) \\ a^2(a-1) + 3a(a-1) + 2(a-1) \\ a^3 - a^2 + 3a^2 - 3a + 2a - 2 \\ a^3 + 2a^2 - 1a - 2\end{aligned}$$