# Polynomials

## Monomial

A monomial is a term of the form $ax^m$, where a is a constant and m is a positive, whole number.

Examples of monomials are:

$3x^2$, $5x^3$, $-6x$, $6y^3$

Variable

Coefficient

## Polynomial

A monomial or two or more monomials combined by addition or subtraction, is a polynomial

Examples of polynomials are:

$3x^2$ → monomial

$5x^3 + 4x^2$ → Binomial

$4x^2 - 2x + 7$ → Trinomial

$x^4 - 5x^3 + 2x^2 + 6$ Polynomia

Some Polynomials have special names based on the number of terms

Monomial → One term

Binomial → two terms

Trinomial → Three terms

## Addition of Polynomials

We will add polynomials by adding like terms

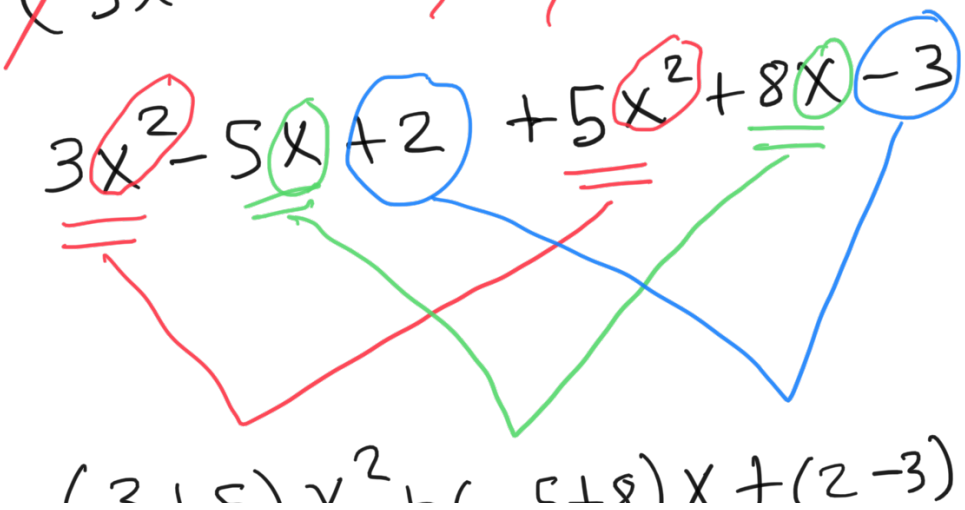
- Remove Parenthesis
- Add coefficients
  Keep variable part

Example 1:

Add $(3x^2-5x+2)+(5x^2+8x-3)$

Solution:

$(3x^2-5x+2)+(5x^2+8x-3)$




$(3+5)x^2+(-5+8)x+(2-3)$

$(3+5)x^2+(-3+0)x+(-1)$

$8x^2+3x+(-1)$

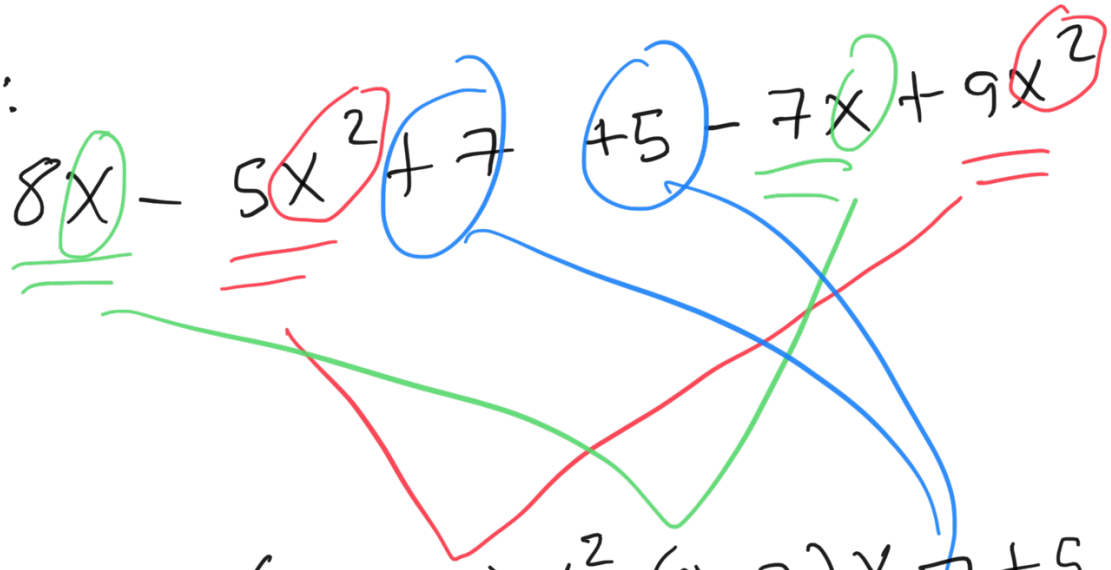
$\boxed{8x^2+3x-1}$

Example 2: Add

$(8x-5x^2+7)+(5-7x+9x^2)$

Sol:

$8x-5x^2+7+5-7x+9x^2$



$(-5+9)x^2+(8-7)x+7+5$

$4x^2+1x+12$

$\boxed{4x^2+x+12}$

# Subtraction of Polynomials

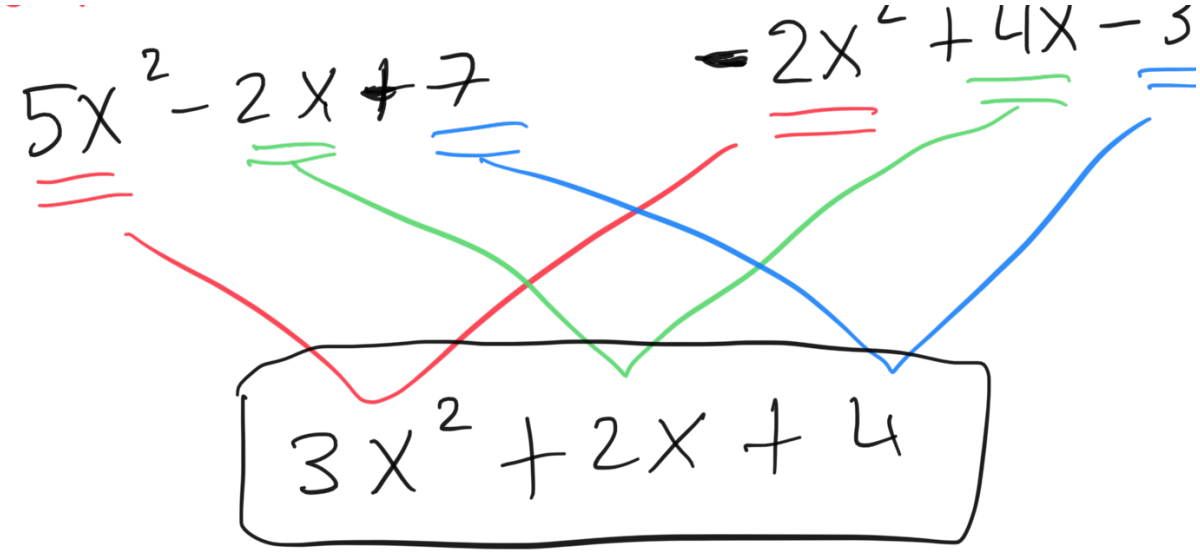
We subtract polynomials by removing parenthesis, keeping first polynomial unchanged, changing signs of 2nd polynomial and combining like terms

Example 1:

Subtract:

$$(5x^2 - 2x + 7) - (2x^2 - 4x + 3)$$

Sol:




# Multiplication of Polynomial

Monomial x Polynomial

Use Distributive Property

Example 1:

Multiply

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

Sol:

$x^2 \cdot x^1 = x^{2+}$

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

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

$$12x^4 - 6x^3 + 9x^2$$

Example 2:

Multiply

$$3a^2(a^4 - 2a^2)$$

Sol:

$(3a^2)(1a^4) - 3a^2(2a^2)$

$2+4$ $\qquad$ $2+2$

$3.1\,a \qquad - \qquad 3.2\,a$

$$3a^6 - 6a^4$$

# Binomial x Binomial

Use the Distributive Property twice

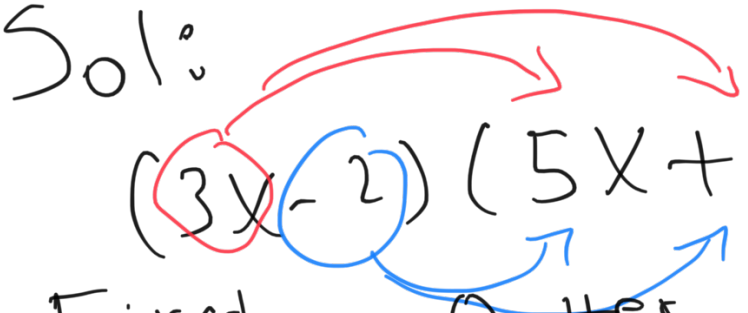
(Equivalently use the FOIL method)

Example 1:

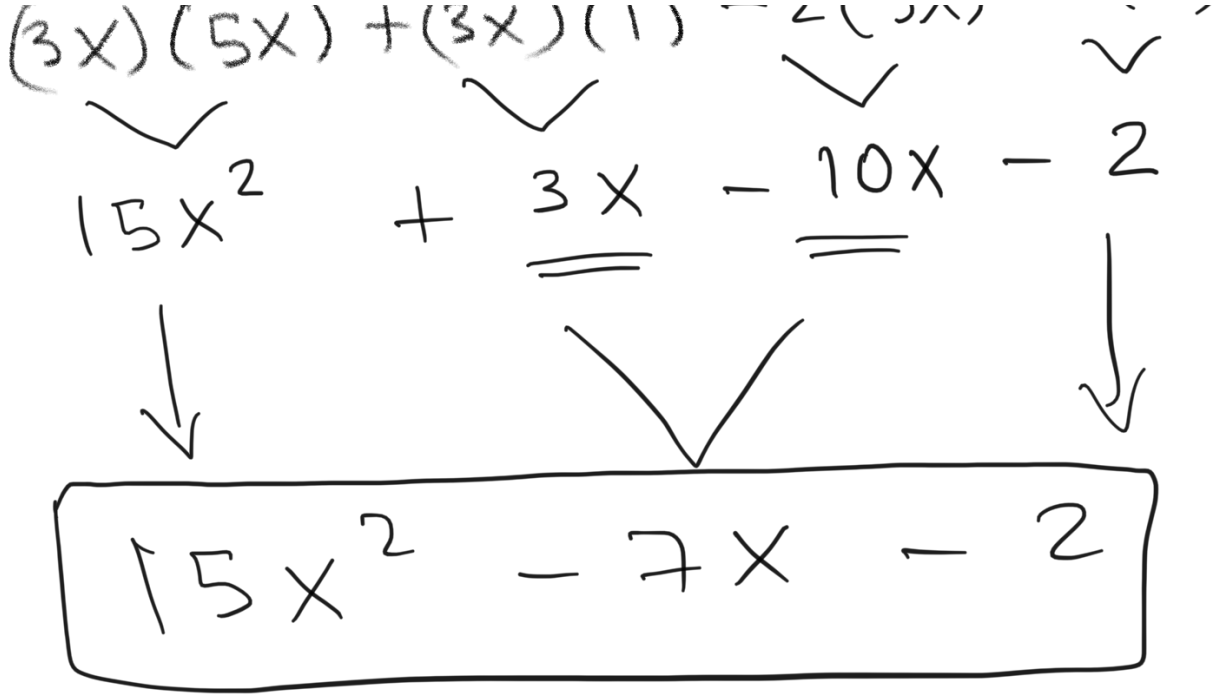
Multiply

$(3x-2)(5x+1)$

Sol:




$-2(5x)-2(1)$




## Binomial x Polynomial

Use Distributive property twice.

Example:

Multiply

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

Solution:

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

$$x \cdot x^2 - x \cdot 2x + x \cdot 3$$

$$2x^2 - 2 \cdot 2x + 2 \cdot 3$$

$$x^3 - 2x^2 + 3x$$

$$2x^2 - 4x + 6$$

$$\boxed{x^3 - x + 6}$$