

Adding and Subtracting Polynomials

What is a POLYNOMIAL ?

A polynomial is an algebraic expression containing several terms. Each term is comprised of numerical coefficients and variable coefficients.

$$\begin{array}{cccc} 4x^2 + 2x & 6x^2 - 3x \\ 2x + 3y - 4z & 4x^2 + 7x \\ & a + b^2 \\ & 17x^2 \end{array}$$

EXAMPLES of polynomials:

Monomial $4x^2$ $12a^3b^2$ $-y^5$ 1 term

Binomial $2x^2 + 3x^5$ $a - b$ $5y - 2x$ 2 terms

Trinomial $3x^2 + 5x - 2$ $a - 3b + c$ 3 terms

Polyomial $4x^2y - 3y + 7x + 10$

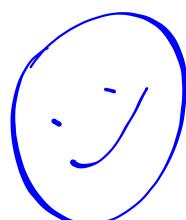
Simplify each of the following:

Example 1: $7x^2 + 3x - 4x^2 + 8x$

$$\begin{aligned} &= \cancel{7x^2} - \cancel{4x^2} + 3x + 8x \\ &= 3x^2 + 11x \quad \text{:) } \end{aligned}$$

Example 2: $4x^4 - 3x^3y + 2x^3 + x^4 - x^3\cancel{y}$

$$\begin{aligned} &= 4x^4 + x^4 - \cancel{3x^3y} - \cancel{x^3y} + 2x^3 \\ &= 5x^4 - 4x^3y + 2x^3 \end{aligned}$$



Example 3: $(2x^2 + 3x - 4) + (5x^2 - x + 6)$

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

$$= \cancel{2x^2} + \cancel{5x^2} + 3x - x - 4 + 6$$

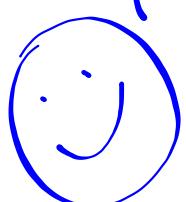
∴ $= 7x^2 + 2x + 2$

Example 4: $(5m^2 - 3mp + 7p^2) - (\cancel{3m^2} - \cancel{11mp} + 21p^2)$

$$= 5m^2 - 3mp + 7p^2 - \cancel{3m^2} + \cancel{11mp} - 21p^2$$

$$= 5m^2 - 3m^2 - 3mp + 11mp + 7p^2 - 21p^2$$

$$= 2m^2 + 8mp - 14p^2$$



Example 5:

Subtract $3k^3 - 2k^2$ from the sum of $4k^3 - k^2 - 4$ and $-k^3 + 3k^2 + 1$

Step 1

$$\begin{aligned} & \overbrace{4k^3 - k^2 - 4}^{\downarrow} + \overbrace{-k^3 + 3k^2 + 1} \\ &= 4k^3 - k^2 - 4 - k^3 + 3k^2 + 1 \\ &= 3k^3 + 2k^2 - 3 \end{aligned}$$

Step 2

$$\begin{aligned} & 3k^3 + 2k^2 - 3 - (3k^3 - 2k^2) \\ &= 3k^3 + 2k^2 - 3 - 3k^3 + 2k^2 \\ &= 4k^2 - 3 \end{aligned}$$

Example 6:

$$\left(\frac{1}{2}x + \frac{1}{5}y\right) - \left(\frac{1}{4}x - y\right)$$

Example 7:

Determine if the following two functions are equivalent:

$$f(x) = (x^2 - 3x) - (2x^2 + 5)$$

and

$$g(x) = (3x^2 - 2x) + (-4x^2 - x - 5)$$

Homework :
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