Adding and Subtracting Polynomials

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Adding and Subtracting powers

Adding and subtracting powers is only really possible when the powers are exactly the same.

$$3^2 + 3^2,\ 4^3 - 4^3 + 24^3$$
$$x^2 - 5x^2,\ -2x + 5x + 3x$$

In this case we would have,

$$\begin{aligned} 3^2 + 3^2 &= 2(3^2) \\ 4^3 - 4^3 + 2(4^3) &= 2(4^5) \\ -2x + 5x + 3x &= 6x \end{aligned}$$

Back to polynomials. Now that we know how to manipulate powers, let's apply arithmetic operations to polynomials.

Adding Polynomials

When adding any number of polynomials, we add like terms. For example,

$$\begin{aligned} & (2x^2 + 3x - 4) + (-5x + x^2 + 1), && \text{group like terms} \\ = \ & (2x^2 + x^2) + (3x - 5x) + (-4 + 1), && \text{add or subtract like terms} \\ = \ & 3x^2 + (-2x) + (-3) \\ = \ & 3x^2 - 2x - 3 \end{aligned}$$

Subtracting Polynomials

When subtracting polynomials it is exaly like adding except we subtract.

$$\begin{aligned} & (-4x^2 + 2x - 3) - (5x^2 + 3x - 9) \\ = \ & (-4x^2 - 5x^2) + (2x - 3x) + (-3 - (-9)) \\ = \ & -9x^2 + (-x) + (-3 + 9) \\ = \ & -9x^2 - x + 6 \end{aligned}$$

Exercises

Add or subtract the following polynomials.

1. $(3x^3 + 4x^2 - 2x) + (x^2 - 5x + 8)$
2. $(-6x^2 + 7) + (14x - 9 + x^2)$
3. $(x^4 - 3x^2 + 1) - (x^2 + x^4)$
4. $(2x^2 - x^3 + x) + (x + 4x^3 + x^4)$
5. $(x^2 + x + 1) - (3 - x - x^2)$
6. $(-6x^3 + 2) + (x^2 + 2x^3)$
7. $(x - 4) - 3x$
8. $(1 - 2x^2 + x^4) - (3 + 3x^2 + 3x^4)$
9. $(x^3 + 4x) - (x^2 + 2x)$
10. $(7 + 5x^3) + (1 + x - 4x^3)$