Multiplying Polynomials

Multiplying Polynomials

- We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

Multiplying Polynomials

- We defined a Polynomial $P(x)$ to be a function of the form:
$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$
- We saw how to add and subtract polynomials.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$\color{red}{C} \cdot (\color{green}{A} + \color{blue}{B}) = \color{red}{C} \cdot \color{green}{A} + \color{red}{C} \cdot \color{blue}{B}$$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$\left(2x^3 - 3x^2 + 5x + 1\right) \cdot \left(x^2 - 2\right) =$$

Multipling Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (\mathbf{2x^3} - 3x^2 + 5x + 1) \cdot \mathbf{x^2} + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= \mathbf{2x^5}$$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - \mathbf{3x^2} + 5x + 1) \cdot \mathbf{x^2} + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - \mathbf{3x^4}$$

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + \mathbf{5x} + 1) \cdot \mathbf{x^2} + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

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

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + \mathbf{1}) \cdot \mathbf{x^2} + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

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

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (\mathbf{2x^3} - 3x^2 + 5x + 1) \cdot (-\mathbf{2})$$

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

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - \mathbf{3x^2} + 5x + 1) \cdot (-\mathbf{2})$$

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

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + \mathbf{5x} + 1) \cdot (-\mathbf{2})$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - \mathbf{10x}$$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + \mathbf{1}) \cdot (-\mathbf{2})$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - \mathbf{2}$$

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2$$

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= \mathbf{2x^5} - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2$$

$$= \mathbf{2x^5}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2x^2 + a_1x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$\begin{aligned} &= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2) \\ &= 2x^5 - \mathbf{3x^4} + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2 \\ &= 2x^5 - \mathbf{3x^4} \end{aligned}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + \mathbf{5x^3} + x^2 - \mathbf{4x^3} + 6x^2 - 10x - 2$$

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

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + \mathbf{x^2} - 4x^3 + \mathbf{6x^2} - 10x - 2$$

$$= 2x^5 - 3x^4 + x^3 + \mathbf{7x^2}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2)$$

$$= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - \mathbf{10x} - 2$$

$$= 2x^5 - 3x^4 + x^3 + 7x^2 - \mathbf{10x}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$\begin{aligned}
&= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2) \\
&= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - \mathbf{2} \\
&= 2x^5 - 3x^4 + x^3 + 7x^2 - 10x - \mathbf{2}
\end{aligned}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.

Multiplying Polynomials

▸ We defined a Polynomial $P(x)$ to be a function of the form:

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$$

▸ We saw how to add and subtract polynomials.

Now we will look at an example where we multiply polynomials.

First, let's remind ourselves of the ▸ Distributive Property

$$C \cdot (A + B) = C \cdot A + C \cdot B$$

Example 1:

$$(2x^3 - 3x^2 + 5x + 1) \cdot (x^2 - 2) =$$

$$\begin{aligned} &= (2x^3 - 3x^2 + 5x + 1) \cdot x^2 + (2x^3 - 3x^2 + 5x + 1) \cdot (-2) \\ &= 2x^5 - 3x^4 + 5x^3 + x^2 - 4x^3 + 6x^2 - 10x - 2 \\ &= 2x^5 - 3x^4 + x^3 + 7x^2 - 10x - 2 \end{aligned}$$

Note: The 8 terms here come from each of the 8 combinations of multiplying a term from the first polynomial by a term from the second.

This means we do not need to write out the full distribution every time, but it is good to know it is happening in the background.

We can simplify this polynomial by adding like terms.