

Dividing Polynomials

Objective 1: Long Division Without Missing Terms

Example 1: Divide the polynomials $(2x^2 + 3x - 5) \div (x + 1)$

Example 2: Divide the polynomials $(12x^3 - 11x^2 + 9x + 18) \div (4x + 3)$

Divide the polynomials:

1. $(4x^2 - 10x + 1) \div (x - 3)$

2. $(8x^3 - 2x^2 - 2x + 8) \div (4x + 3)$

Objective 2: Long Division with Missing Terms

When you have missing powers of x , make sure to include place holders.

Example 1: Divide the polynomials $(3x^4 - 12x + 5) \div (x + 1)$

Divide the polynomials:

1. $(4x^2 - 2) \div (x + 2)$

2. $(x^3 + 4x^2 + 4) \div (x - 2)$

Objective 3: Factoring Using Long Division

We can use long division to help us factor a polynomial, but only if you get a remainder of zero.

Example 1: Use long division to show how the numerator factors:

$$\frac{3x^2 + 11x - 4}{3x - 1}$$

Use long division to show how the numerator factors:

1. $\frac{10x^2+x-3}{2x-1}$

2. $\frac{15x^2-8x-1}{3x+2}$

Objective 4: Synthetic Division

When the divisor is of the form $x - c$, we can use a process called **synthetic division**.

Example 1: Determine whether synthetic division can be used.

(a) $(x^3 - 4x^2 + 2x + 5) \div (x - 3)$

(b) $(2x^2 - 3x + 7) \div (x^2 - 2)$

(c) $(3x^3 - 6x^2 + x + 8) \div (3x^2 - 2)$

(d) $(6x^2 - x + 5) \div (x + 1)$

Example 2: Divide the polynomials using synthetic division $(3x^3 - 5x^2 + x - 2) \div (x - 2)$

Example 3: Divide the polynomials using synthetic division $(x^4 + 5x^3 - 6x + 3) \div (x + 3)$

Divide the polynomials using synthetic division:

1. $(5x^3 + 7x^2 - 6x + 7) \div (x + 1)$

2. $(x^3 - 2x + 1) \div (x - 1)$