

Polynomial Division

Dividing a Polynomial by a Monomial

Recall that, when adding fractions with a common denominator, we can combine the two fractions into a single fraction with the common denominator as the new denominator:

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}.$$

This process can be reversed and we can rewrite a single fraction as the sum of two or more fractions each of which has the denominator as their denominator:

$$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$$

Example 1: Dividing a Polynomial by a Monomial

Divide $\frac{36x^4 - 3x^2}{9}$.

Solution: $\frac{36x^4 - 3x^2}{9} = \frac{36x^4}{9} - \frac{3x^2}{9} = 4x^4 - \frac{1}{3}x^2$

Example 2: Dividing a Polynomial by a Monomial

Divide $\frac{4x^6 - 32x^5 + 24x^2}{8}$.

Example 3: Dividing a Polynomial by a Monomial

Divide $\frac{x^3 - 3x^2 + 4x}{x}$.

Example 4: Dividing a Polynomial by a Monomial

Divide $\frac{24x^6 - 2x^5 + 4x^3}{-2x^2}$.

Example 5: Dividing a Polynomial by a Monomial

Divide $(-12y^7 + 14y^6 - 6y^4) \div (-2x^2)$.

Example 6: Dividing a Polynomial by a Monomial

Divide $(18x^3y^7 - 24x^2y^6 - 6xy^4) \div (-3xy^2)$.

Dividing a Polynomial by a Polynomial

Polynomial long division is similar to ordinary long division of real numbers.

Example 7: Long Division

Divide: $1342 \div 11$

Example 8: Dividing a Polynomial by a Polynomial

Divide: $\frac{x^2 + 5x + 6}{x + 2}$

Example 9: Dividing a Polynomial by a Polynomial

Divide: $\frac{x^2 - 8x + 15}{x - 3}$

Example 10: Dividing a Polynomial by a Polynomial

Divide: $\frac{x^2 - 7x + 15}{x - 4}$

Example 11: Dividing a Polynomial by a Polynomial

Divide: $\frac{6x^2 + x - 12}{2x + 3}$

Example 12: Dividing a Polynomial by a Polynomial

Divide: $\frac{x^2 - 9}{x + 3}$

Example 13: Dividing a Polynomial by a Polynomial

Divide: $\frac{x^3 - 125}{x - 5}$