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### 4.3 Division of Polynomials

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### Division by a Monomial

Divide each term of the polynomial by the monomial

Example: Divide  $\frac{5x^3 - 10x^2 + 5x}{15x^2}$

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### Long Division of Polynomials

The process of long division of polynomials is similar to long division of numbers.

Examples: Divide  $\frac{12x^3 - 14x^2 + 7x - 7}{3x - 2}$

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

Divide  $\frac{3x^4 - 2x^2 - 5}{3x^2 - 5}$

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Synthetic Division

Synthetic division is a short cut to the process of long division.

Examples: Divide  $\frac{x^3 - 2x^2 - x + 3}{x + 1}$

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

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**REMAINDER THEOREM**

If a polynomial  $f(x)$  is divided by  $x - k$ , the remainder is  $f(k)$ .

Example: Use the remainder theorem to find the remainder when  $f(x) = -4x^2 + 6x - 7$  is divided by  $x + 4$

From *Precalculus with Modeling and Visualization* 3<sup>rd</sup> ed. by Rockswold, 2006, p.279

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