Chapter 5 Section 1
Introduction to Polynomials and Polynomial Functions

Polynomial: Single term
Sum of two or more terms containing variable with whole-number exponents

Example:
$-49x^3+80x^2+37x+125$

Standard form: Terms in order of descending powers of the variable,
Degree of a term: exponent.

$-49x^3+80x^2+37x+125$
Degree: 3 2 1 0

Monomial: simplified polynomial – exactly one term
Binomial: Simplified polynomial that has two terms
Trinomial: Simplified polynomial that has three terms.

Polynomial – two variables
Sum of one or more monomials of the form: $ax^n y^m$

Coefficient: constant 'a'

Degree of the term: sum of the exponents.

Degree of a Polynomial: greatest degree of any term of the polynomial

Leading term: one term of the greatest degree.

Leading coefficient: Coefficient of the leading term

Example 1: Page 315:
$7x^2y^3-17x^4y^2+xy-6y^2+9$

Term	Coefficient	Degree (sum of exponents

Degree of the polynomial

Leading term

Leading coefficient

Polynomial function: expression that defines the functions

Evaluate a Polynomial Function
Use substitution.
Find f(2)

Polynomial function: $f(x) = 4x^3 - 3x^2 - 5x + 6$

Smooth, Continuous Graphs
Polynomial functions of degree 2 or higher have graphs that are smooth and continuous
Smooth: rounded curves with not sharp corners
Continuous: no breaks and can be drawn without lifting your pencil

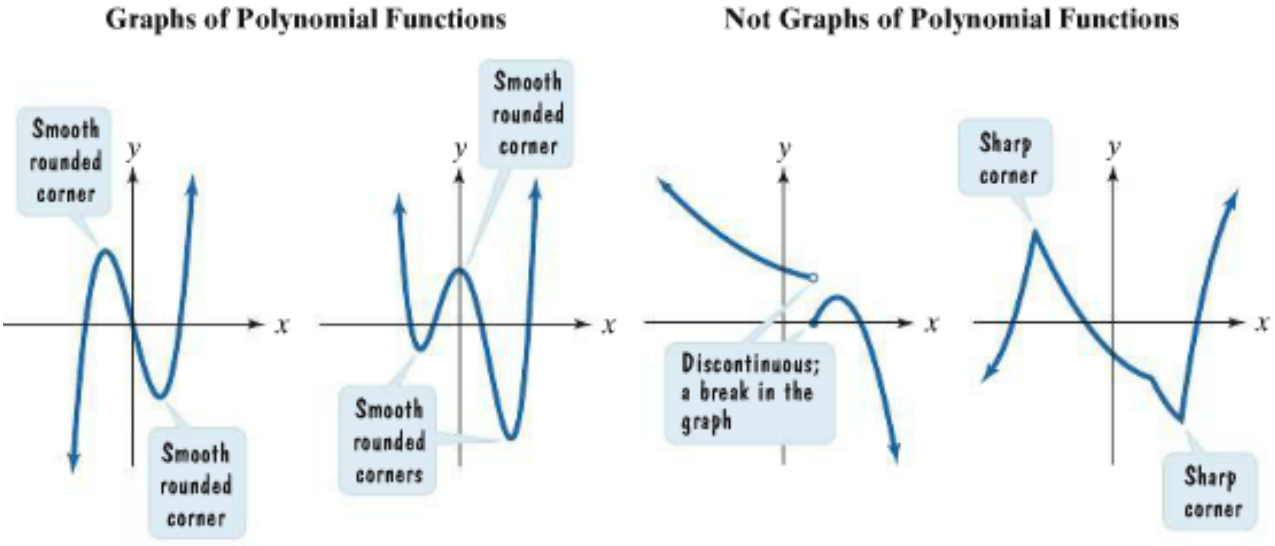


Figure 5.3 Recognizing graphs of polynomial functions

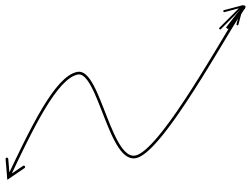
End Behavior of Polynomial Functions

End behavior depends upon the leading term

Leading Coefficient Test.

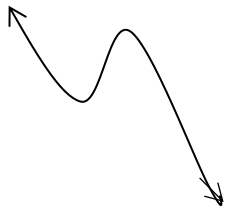
Odd degree polynomial
Leading coefficient positive

Down the up

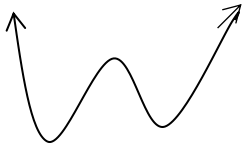


negative

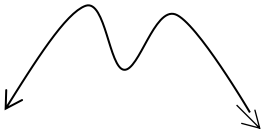
Up then down



Even degree polynomial
Leading coefficient positive
Up and up



negative
down and down



Determine the shape of the graph:
f(x) = $-49x^3+806x^2+3776x+2503$

Solution:
Since x^3 is odd and the coefficient is negative, it is a up, down graph

Adding Polynomials
Combine like terms.
Example 6: page 321
Add: $\left(-6x^3+5x^2+4\right)+\left(2x^3+7x^2-10\right)$

Subtracting Polynomials

Adding the opposite of the number being subtracted.

8 – 3 = 8 + (-3)

Example 8: page 322

Subtract: $\left(7x^3-8x^2+9x-6\right)-\left(2x^3-6x^2-3x+9\right)$

$\left(7x^3-8x^2+9x-6\right)+\left(-2x^3+6x^2+3x-9\right)$	Add the opposite
$7x^3-8x^2+9x-6\ -2x^3+6x^2+3x-9$	Remove the parentheses Combine like terms