

0.3 FAMILIES OF FUNCTIONS

A *polynomial in x* is a function that is expressible as a sum of finitely many terms of the form cx^n , where c is a constant and n is a nonnegative integer.

$$c_0 + c_1x + c_2x^2 + \cdots + c_nx^n.$$

$$c_nx^n + c_2x^2 + c_1x + \cdots + c_0.$$

c_0, c_1, \dots, c_n are constants

n nonnegative integer

The natural domain of a polynomial in x is $(-\infty, \infty)$

$$3 + 5x$$

Has degree 1 (linear)

$$x^2 - 3x + 1$$

Has degree 2 (quadratic)

$$2x^3 - 7$$

Has degree 3 (cubic)

$$8x^4 - 9x^3 + 5x - 3$$

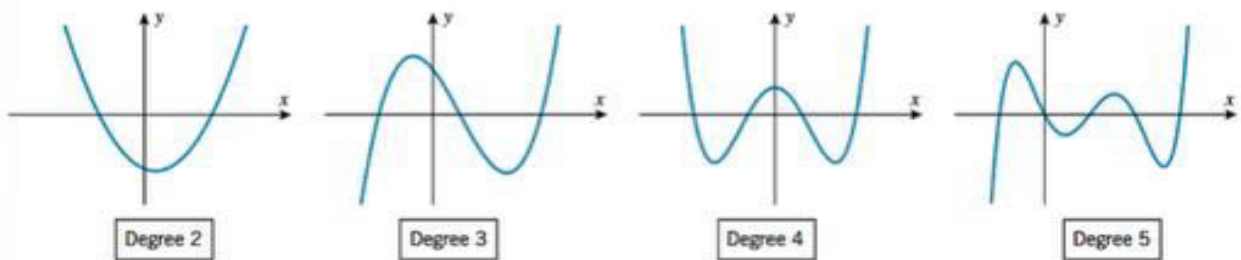
Has degree 4 (quartic)

$$\sqrt{3} + x^3 + x^5$$

Has degree 5 (quintic)

$$(x^2 - 4)^3$$

Has degree 6 [see (3)]



▲ Figure 0.3.10

RATIONAL FUNCTIONS

A function that can be expressed as a ratio of two polynomials is called a **rational function**.

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If $P(x)$ and $Q(x)$ are polynomials, then the **domain** of rational function consists of all x such that $Q(x) \neq 0$

$$f(x) = \frac{x^2 + 2x}{x^2 - 1}$$

