Chapter 2: Polynomials Frayer model

Definition

A polynomial is a function given by: $f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$

a_n: leading coefficient

The degree is n

All exponents must be non negative integers (positive or 0)

Facts

- The degree of a polynomial is the highest exponent
- Some polynomials have no degree $f(x) = 0$
- Some polynomials have a low degree (constant, linear, quadratic)
- The domain of polynomial functions $(-\infty, \infty)$
- Polynomials are continuous on all real numbers
- The most familiar function
- Polynomials are widely used in economics

Polynomials

Examples

- $f(x) = 4x^3 - 5x - \frac{1}{2}$
- $k(x) = 15x - 2x^4$ ← degree; ↙ leading coefficient
- $f(x) = 15$ constant (degree = 0)
- $f(x) = 0$ zero function, degree is undefined

Non-Examples

- $g(x) = 6x^{-4} + 7$ (Exponents cannot be negative)
- $g(x) = 3x^{\frac{1}{3}}$ ↘ Exponents have to be integers.
- $h(x) = \frac{3}{x^5}$
- $\sqrt{9x^4 + 16x^2}$

$= 3x^2 + 4x$ we cannot separate since there is a ⊕ under √

- $f(x) = 5x^{\frac{1}{2}} = 5\sqrt{x}$