

UNIT 1 : Polynomial Functions

Chapter 3 Sections 3.1 - 3.4

3.1 Characteristics of Polynomial Functions

polynomial function: a function in the form

$$y = \underbrace{a}_{\substack{\text{leading} \\ \text{coefficient}}} x^{\underbrace{n}_{\substack{\text{largest exponent} \\ \text{"degree"} \\ \text{(whole #'s)}}}} + bx^{n-1} + cx^{n-2} + \dots + k$$

constant



a, b, c, \dots, k are real numbers

Types of Polynomials :

Equation	Degree	Type of Poly	Graph
$f(x) = a$	0	Constant	horizontal line
$f(x) = ax + b$	1	linear	line with slope a
$f(x) = ax^2 + bx + c$	2	Quadratic	Parabola U
$f(x) = ax^3 + bx^2 + cx + d$	3	Cubic	sideways "S" ~
$f(x) = ax^4 + bx^3 + cx^2 + dx + e$	4	Quartic	w or m
$f(x) = ax^5 + bx^4 + cx^3 + dx^2$	5	Quintic	w m

+ ex + f

Characteristics of Polynomials:

- Domain is $\{x | x \in \mathbb{R}\} \Rightarrow$ graph is continuous
 - Graphs have only smooth curves with the ^{max} number of turning points being one less than the degree
 - odd degree polynomials will have a Range of $\{y | y \in \mathbb{R}\}$
 - constant term is the y-intercept.
-  • If the leading coefficient is pos. then graph rises to the right. If the leading coefficient is neg. then graph falls to the right
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- max number of x-intercepts is equal to the degree

Ex: Identify the features of

$$f(x) = -3x^2 + 9x + x^5$$

first rewrite as:

$$f(x) = x^5 - 3x^2 + 9x$$

degree 5 called a quintic

max # of turning pts is 4

max # of x-int is 5

graph rises to the right

y-int : (0,0)

D: $\{x | x \in \mathbb{R}\}$

R: $\{y | y \in \mathbb{R}\}$