

3.1 Characteristics of Polynomial Functions

Polynomial Function: A function of the form: $f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_1 x^1 + a_0$

where : n is a whole number

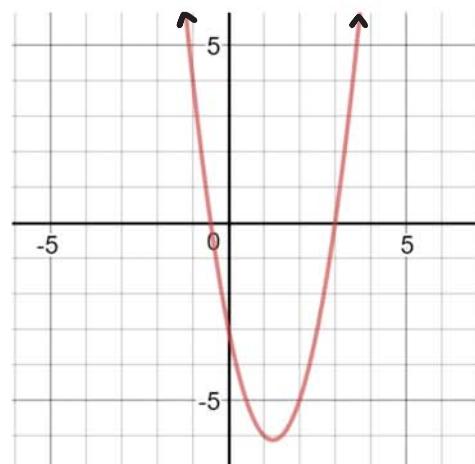
x is a variable

$a_n, a_{n-1}, a_{n-2}, \dots, a_0$ are real numbers (coefficients)

Degree	• highest exponent of the polynomial function
Constant term	• term with no variable (a_0) • y-intercept
Number of possible x-intercepts	• number of times the function crosses the x-axis (degree of the function)
Leading coefficient	• coefficient in front of the highest degree term
End behavior	• directions and quadrants that the polynomial extends in to.

1. Using the equation and the graph of $f(x) = 2x^2 - 5x - 3$, find the following:

Degree	2
Constant term	-3
Number of possible x-intercepts	2
Leading coefficient	positive (+2)
End behavior	up in quad I up in quad II



2. Use a graphing calculator to make a sketch of each function. Then look for patterns that will allow you to determine (degree, constant term, number of possible x-intercepts, leading coefficient and end behavior) without graphing the function.

Type	$y = x$	$y = -3x$	$y = x + 1$	$y = x - 4$
Linear	$y = x$	$y = -3x$	$y = x + 1$	$y = x - 4$
Quadratic	$y = x^2$	$y = -2x^2$	$y = x^2 + 3$	$y = x^2 - x - 2$
Cubic	$y = x^3$	$y = -4x^3$	$y = x^3 - 4$	$y = x^3 + 4x^2 + x - 6$
Quartic	$y = x^4$	$y = -2x^4$	$y = x^4 + 2$	$y = x^4 + x^3 - 7x^2 + 8$
Quintic	$y = x^5$	$y = -x^5$	$y = x^5 - 1$	$y = x^5 + 3x^4 - x^2 + 2$

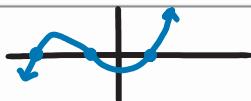
3. Without graphing, describe the function: $y = -x^4 + 10x^2 + 5x - 2$.

Degree	4 (quartic polynomial)
Constant term	-2
Number of possible x -intercepts	4
Leading coefficient	-1 negative
End behavior	down in quad III down in quad IV
Direction of opening	opens down



4. Without graphing, describe the function: $y = x^3 + x^2 - 5x + 8$.

Degree	3 (cubic polynomial)
Constant term	8
Number of possible x -intercepts	3
Leading coefficient	+1 positive
End behavior	down in quad III up in quad I
Direction of opening	N/A



↳ only applicable for even-number degree polynomials

Practice: p.114 #1 – 5, 7 – 9

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