

Terminology

Polynomial (many terms): a collection of terms strung together, each term containing the variable raised to a positive integer. A polynomial contains only one variable.

Term: a part of a polynomial. Terms are either positive or negative, and consist of two parts:

1. The **coefficient**, or the number that is multiplying the variable.
2. The **variable**, raised to a power.

Leading Term: the term with the highest power.

Degree: the highest power.

Zero: Any value of x that results in zero when you plug it in. Factor the polynomial, set each factor equal to zero. A zero is also known as a root, solution, and x -intercept.

Multiplicity: The number of times that a zero occurs.

End Behavior

End behavior means what is the graph doing on the left side and the right side. The answer depends on the degree of the polynomial and the sign of the lead coefficient.

Degree	Positive Coefficient		Negative Coefficient	
Odd	$y \rightarrow -\infty$ as $x \rightarrow -\infty$ y goes down as x goes left		$y \rightarrow +\infty$ as $x \rightarrow -\infty$ y goes up as x goes left	
	$y \rightarrow +\infty$ as $x \rightarrow +\infty$ y goes up as x goes right		$y \rightarrow -\infty$ as $x \rightarrow +\infty$ y goes down as x goes right	
Even	$y \rightarrow +\infty$ as $x \rightarrow -\infty$ y goes up as x goes left		$y \rightarrow -\infty$ as $x \rightarrow -\infty$ y goes down as x goes left	
	$y \rightarrow +\infty$ as $x \rightarrow +\infty$ y goes up as x goes right		$y \rightarrow -\infty$ as $x \rightarrow +\infty$ y goes down as x goes right	

Another way to remember this is by the signs of x and y for each quadrant.

Q2	x-	x+
	y+	y-
	x-	y+
Q3	y-	y-
		Q4

Chapter 4	Polynomials and Rational Functions
Section 1	Polynomial Functions and Their Graphs

Graphing Guidelines

1. Find the x- and y-intercepts.
2. Evaluate test points.
3. Identify end behavior.

Using Zeros to Graph a Polynomial

Use the zeros as critical values. Plot them on a number line and set up a sign chart. Select test values.

- The intervals that are positive are where the function is above the x-axis.
- The intervals that are negative are where the function is below the x-axis.

Finding Zeros of a Polynomial

1. Factor the function, then set each factor equal to zero and solve for the variable.
2. Graph the function in the calculator and use the ZERO (TI-83) or ROOT (TI-86) function.

Local Maxima and Minima

Also called local extrema. Related to max/min that we found with quadratic equations in the last chapter. Simply a high or low point on the curve.