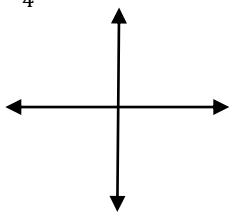
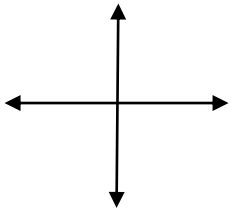
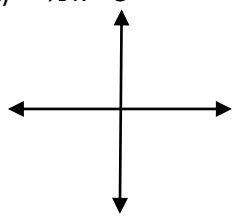
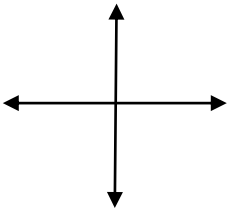
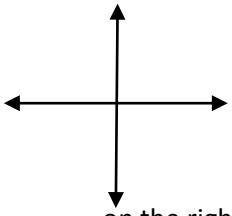
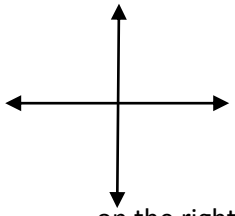
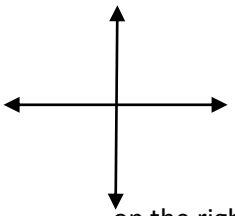
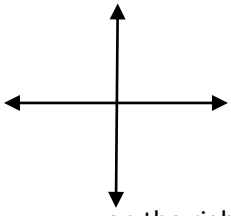
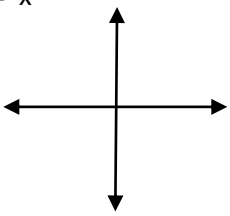
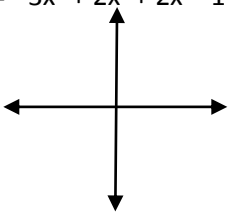
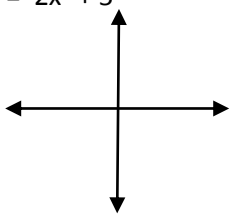
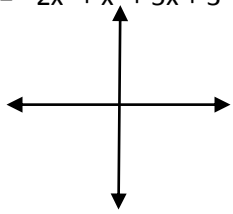
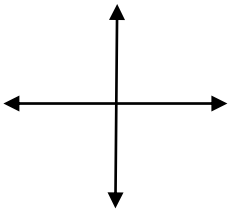
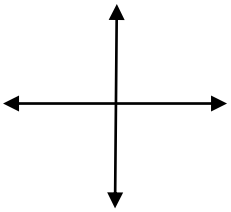
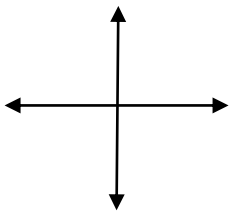
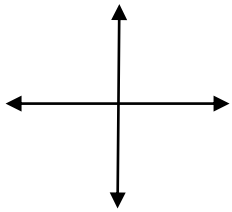
Polynomial Functions

Name _____

A **monomial** is a number, a variable, or the product of a number and one or more variables. A **polynomial** is a monomial or a sum of monomials. A **polynomial function** is of the form $f(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$. When a polynomial is written in descending powers of x, the number in front (multiplied by the highest power of x) is the **leading coefficient**. The highest power of x is the **degree** of the polynomial. The last term is the **constant**.

Exploration

Using Desmos or a graphing calculator, graph the following functions. Make a quick sketch, then describe their end behavior. Are they rising on the right or falling on the right?

Linear	$f(x) = \frac{3}{4}x + 2$  _____ on the right	$f(x) = 4x - 3$  _____ on the right	$f(x) = -½\,x - 5$  _____ on the right	$f(x) = -x + 4$  _____ on the right
Quadratic	$f(x) = x^2$  _____ on the right	$f(x) = -2(x-1)^2 + 3$  _____ on the right	$f(x) = (x+2)^2$  _____ on the right	$f(x) = -3x^2 - 4x - 1$  _____ on the right
Cubic	$f(x) = x^3$  _____ on the right	$f(x) = -3x^3 + 2x^2 + 2x - 1$  _____ on the right	$f(x) = 2x^3 + 5$  _____ on the right	$f(x) = -2x^3 + x^2 + 5x + 3$  _____ on the right
Quartic	$f(x) = x^4$  _____ on the right	$f(x) = x^4 - 4$  _____ on the right	$f(x) = -x^4 + 2x^3 - x + 4$  _____ on the right	$f(x) = -2x^4 + 8x^2 - 3$  _____ on the right

Look for a Pattern

What do all of the polynomials that **rise** on the right have in common? _____

What do all of the polynomials that **fall** on the right have in common?_____

What do you notice about the polynomials that do the **same** on the left and the right? _____

What do polynomials that do the **opposite** on the left and the right have in common? _____