MATH 125 College Algebra OpenStax Name:_____Section_____

Section 5.2 Video Worksheet Professor _____

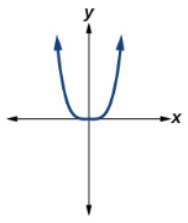
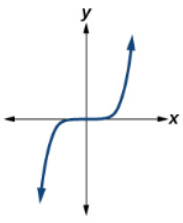
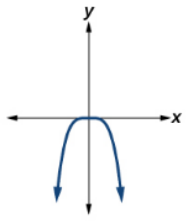
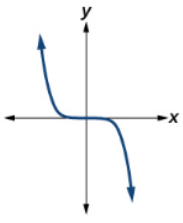
Power Functions and Polynomial Functions

A power function is a function that can be represented in the form _____ where *k* and *p* are _____ numbers, _____ is known as the coefficient.

Examples of power functions:

$f(x) = 1$		Constant function
$f(x) = x$		Identify function
$f(x) = x^2$		Quadratic function
$f(x) = x^3$		Cubic function
$f(x) = \frac{1}{x}$		Reciprocal function
$f(x) = \frac{1}{x^2}$		Reciprocal squared function
$f(x) = \sqrt{x}$		Square root function
$f(x) = \sqrt[3]{x}$		Cube root function

End Behaviour of a power function:

	Even power	Odd power
Positive constant $k > 0$	 $x \to -\infty, f(x) \to \infty$ and $x \to \infty, f(x) \to \infty$	 $x \to -\infty, f(x) \to -\infty$ and $x \to \infty, f(x) \to \infty$
Negative constant $k < 0$	 $x \to -\infty, f(x) \to -\infty$ and $x \to \infty, f(x) \to -\infty$	 $x \to -\infty, f(x) \to \infty$ and $x \to \infty, f(x) \to -\infty$

POLYNOMIAL FUNCTIONS

Let n be a non-negative integer. A **polynomial function** is a function that can be written in the form

$$f(x) = a_n x^n + \ldots + a_2 x^2 + a_1 x + a_0$$

This is called the general form of a polynomial function. Each a_i is a coefficient and can be any real number, but a_n cannot = 0. Each expression $a_i x^i$ is a **term of a polynomial function**.

The degree of the polynomial is _____. The leading coefficient is_____.

End Behaviour of a polynomial function behaves the same as a power function when only looking at the leading term.

Turning points can also be called local maximums or minimums.

x-intercepts set _____ and solve for _____ y-intercepts set _____ and solve for _____

A polynomial of degree *n* will have at most _____ intercepts and _____ turning points.

$f(x)=3x^7-5x^2-8$ degree_____ leading coefficient_____ $\lim_{x\to\infty} f(x)=$_____ $\lim_{x\to-\infty} f(x)=$_____

$f(x)=-2x^6+3x^4+7x^2-15$ degree_____ leading coefficient_____ $\lim_{x\to\infty} f(x)=$_____ $\lim_{x\to-\infty} f(x)=$_____

$f(x)=5(x-3)^2(4-x)^3(x+2)$ degree_____ leading coefficient_____ $\lim_{x\to\infty} f(x)=$_____ $\lim_{x\to-\infty} f(x)=$_____

$f(x)=5x(x-3)^2(4-x)^3(x+2)$ degree_____ leading coefficient_____ $\lim_{x\to\infty} f(x)=$_____ $\lim_{x\to-\infty} f(x)=$_____

$f(x)=-5x(x-3)^2(4-x)^3(x+2)$ degree_____ leading coefficient____ $\lim_{x\to\infty} f(x)=$_____ $\lim_{x\to-\infty} f(x)=$_____

Find the intercepts:

$y=-2(x+1)^2(x+4)^3$ $y=-2x^3(x+2)^2(x-3)^2$ $y=-2x(3x+2)^2(16x^2-9)$

What is the least possible degree of the graph? _____

How many turning points occur?_____