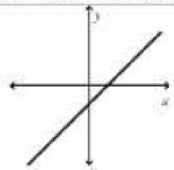
Algebra Two, Polynomial Unit Day 1 Name: ________________________ Date: _____________

INTRODUCTION TO THE APPEARANCE OF FUNCTIONS

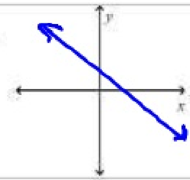
1ST Degree Equations: Equations in the Form $y = ax + b$ $y = mx + b$ *Number of Turns:* 0

When $a > 0$



(End behavior)
$a > 0$
right side goes up

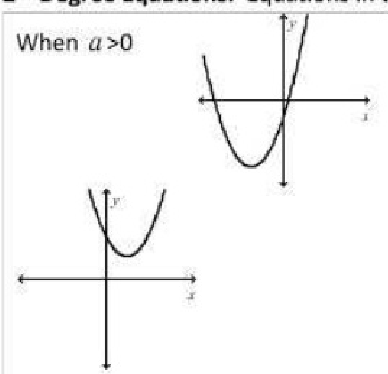
When $a < 0$



end behavior
right end goes down

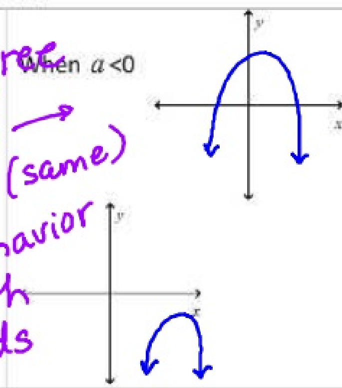
2nd Degree Equations: Equations in the Form $y = ax^2 + bx + c$ *Number of Turns:* 1

When $a > 0$



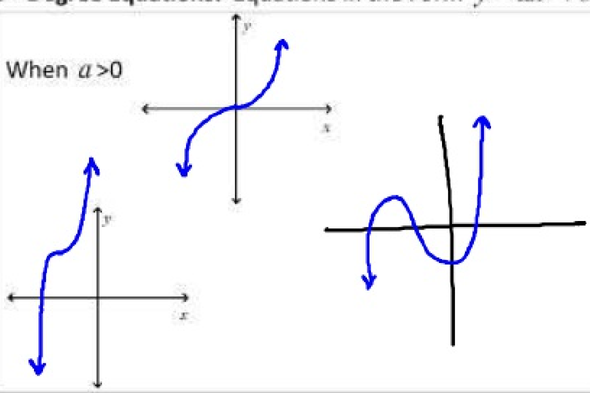
If degree is even → equal (same) behavior at both ends

When $a < 0$

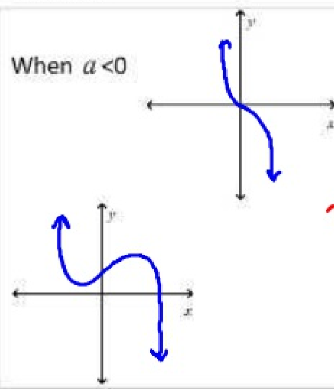


3rd Degree Equations: Equations in the Form $y = ax^3 + bx^2 + cx + d$ *Number of Turns:* 2

When $a > 0$



When $a < 0$

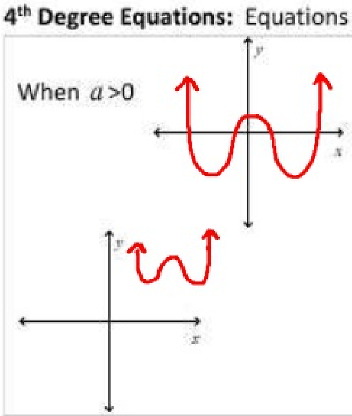


If degree is odd, ⇒ opposite end behavior

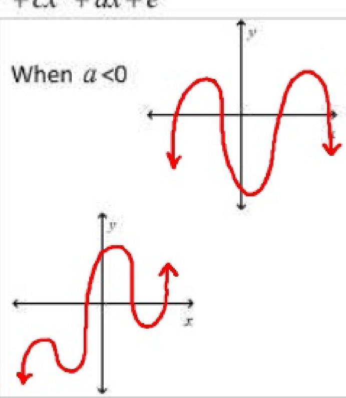
Degree − 1 = # Turns

4th Degree Equations: Equations in the Form $y = ax^4 + bx^3 + cx^2 + dx + e$ *Number of Turns:* 3

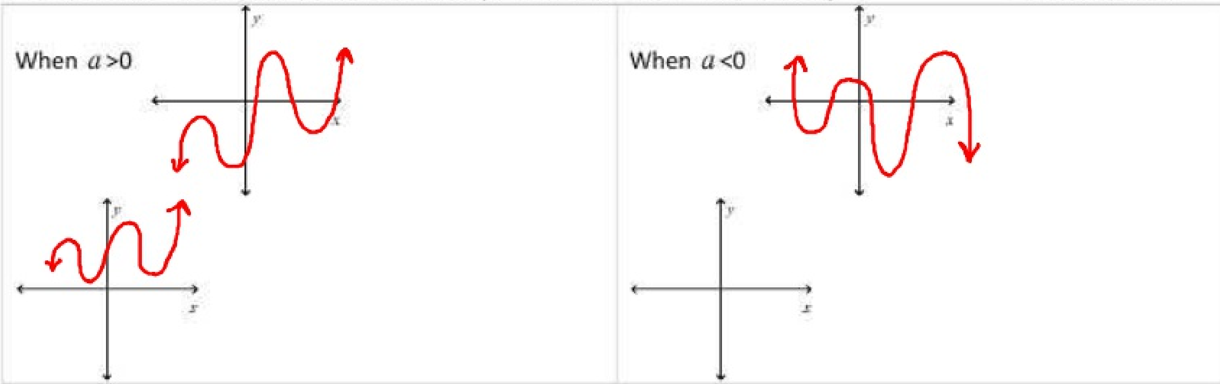
When $a > 0$



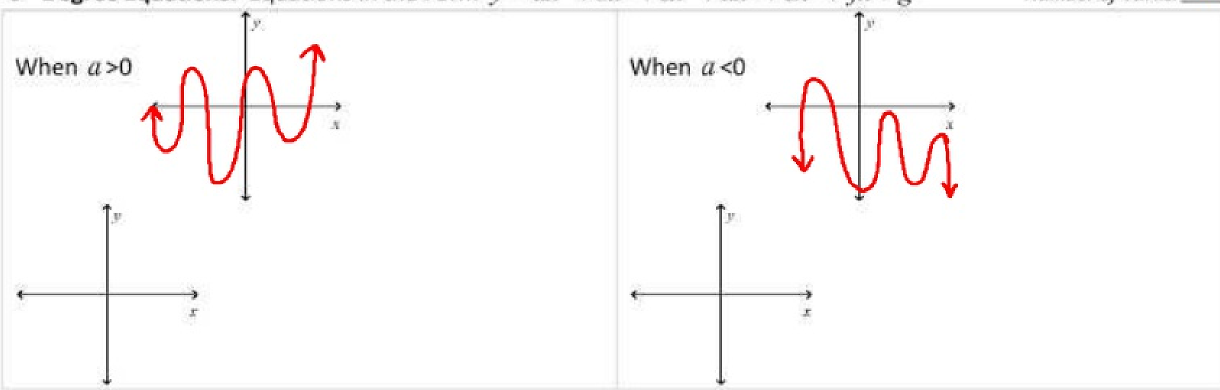
When $a < 0$



5^{th} Degree Equations: Equations in the Form $y = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$ *Number of Turns:* 4

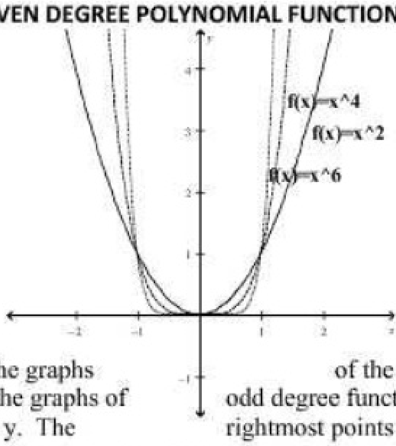


6^{th} Degree Equations: Equations in the Form $y = ax^6 + bx^5 + cx^4 + dx^3 + ex^2 + fx + g$ *Number of Turns:* 5

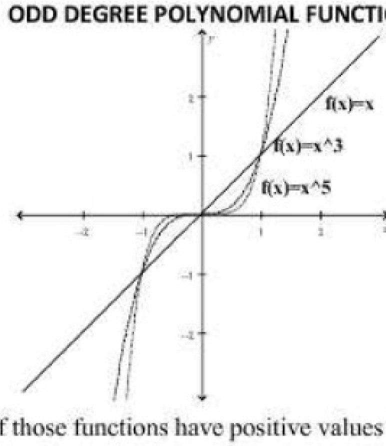


Graphs of polynomials in the form $f(x) = x^n$:

EVEN DEGREE POLYNOMIAL FUNCTIONS



ODD DEGREE POLYNOMIAL FUNCTIONS



1. Study the graphs of the odd functions. The leftmost points of the graphs of odd degree functions have negative values for y. The rightmost points of the graphs of those functions have positive values for y.

(a) End Behavior for odd functions (a>0): right end up, left end down

(b) End Behavior for even functions (a>0): right end up, left end up

What if the leading coefficient is negative (less than zero)?

(c) End Behavior for odd functions (a<0): right end down, left up

(d) End Behavior for even functions (a<0): right down, left down

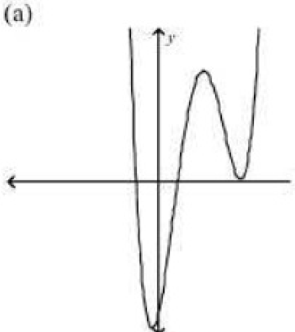
2. Without a calculator, answer the following questions:

(a) Given $f(x) = -x^2 + 2x - 3$, describe the end behavior: right down, left down

(b) Given $g(x) = x^5 + x$, describe the end behavior: right up, leftdown

3. Determine if each graph represents an odd degree function or an even degree function and determine the degree of the function:

(a)

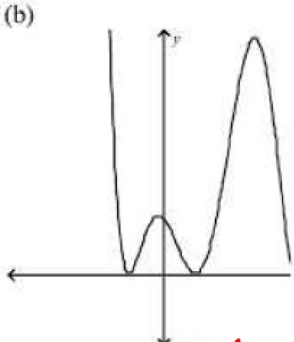


Even or Odd: Even

Number of Turns: 3

Degree of the Polynomial: 4

(b)

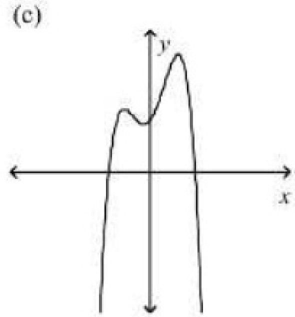


Even or Odd: Odd

Number of Turns: 4

Degree of the Polynomial: 5

(c)

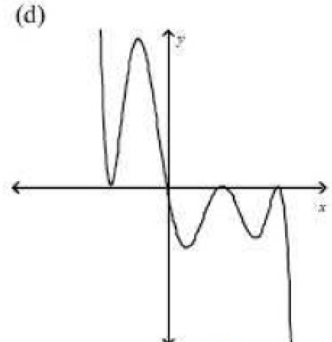


Even or Odd: Even

Number of Turns: 3

Degree of the Polynomial: 4

(d)



Even or Odd: odd

Number of Turns: 6

Degree of the Polynomial: 7

4. Remember, where the graph crosses the x-axis is called a zero of a function. (Also called, x-intercepts, solutions, or roots).

The number of solutions is ALWAYS equal to the degree of the polynomial.

Polynomials can have IMAGINARY solutions. Imaginary solutions always come in pairs. (conjugates like $3+2i$, $3-2i$)

5. Determine the number of imaginary solutions that each of the following polynomials must have.

(a) A 3rd degree polynomial that has 1 real solution must have 2 imaginary solutions. $3-1=2$

(b) An 8th degree polynomial that has 4 real solutions must have 4 imaginary solutions.

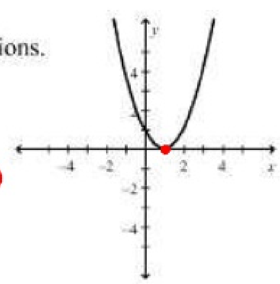
(c) A 2nd degree polynomial that has no real solutions must have 2 imaginary solutions.

(d) A 98th degree polynomial that has 98 real solutions must have 0 imaginary solutions.

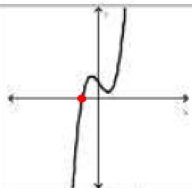
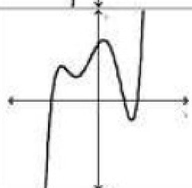
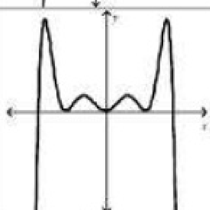
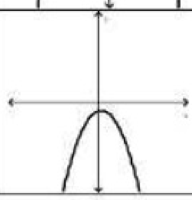
6. The following represents a 2nd degree equation and therefore must have 2 solutions. Because the graph comes down and "bounces" off the x-axis, we call this a Double Root. This will "count" as two solutions.

$x=1$

$(x-1)^2=0$

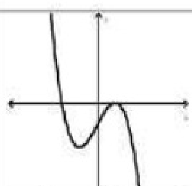
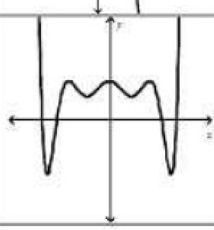


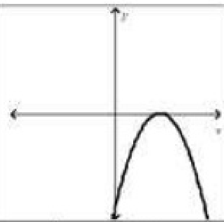
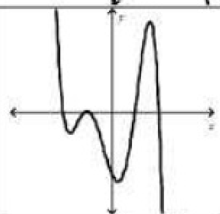
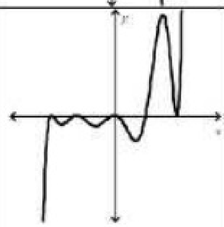
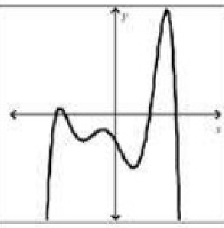
7. Answer the questions about the following polynomials:

	Graph	Leftmost y values (turns up or turns down)	Rightmost y values (turns up or turns down)	Even or Odd Degree	a>0 or a<0	Degree of Function	Total # of Solutions	# of Real Solutions	# of Double Roots	# of Imaginary Solutions
(a)		down	up	odd	a>0	3	3	1	0	2
(b)										
(c)										
(d)										

Algebra Two Name:________________________ Date: _____________

HOMEWORK - INTRODUCTION TO THE APPEARANCE OF FUNCTIONS

	Graph	Leftmost y values (turns up or turns down)	Rightmost y values (turns up or turns down)	Even or Odd Degree	a>0 or a<0	Degree of Function	Total # of Solutions	# of Real Solutions	# of Double Roots	# of Imaginary Solutions
1.										
2.										

3.										
4.										
5.										
6.										

Without a calculator, answer the following questions:

7. Given $f(x) = x^3 + 2x^2 - 3x$, describe the end behavior: ______________________________

8. Given $g(x) = -x^4 + 4x$, describe the end behavior: ______________________________