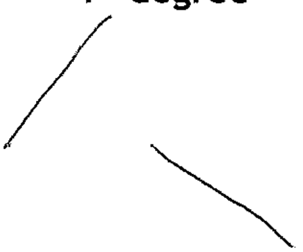
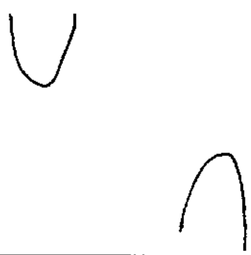
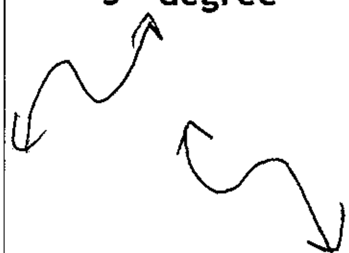
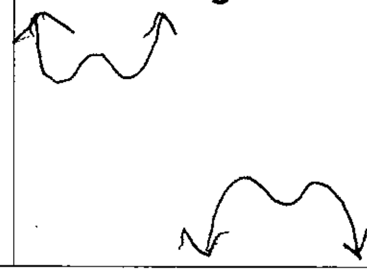
Algebra 3-4
Ch 9 Day 1 Exploring Polynomials Notes

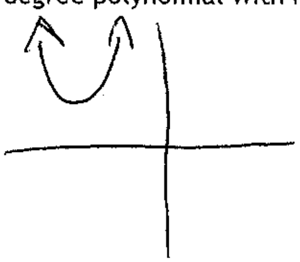
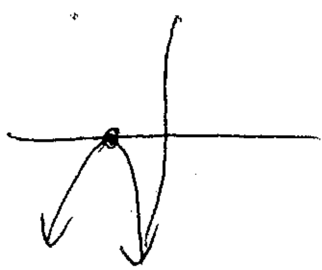
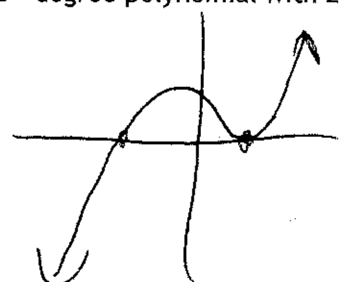
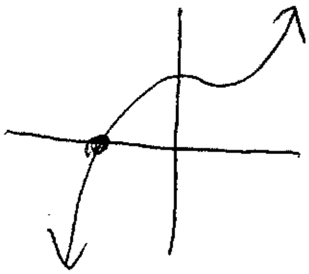
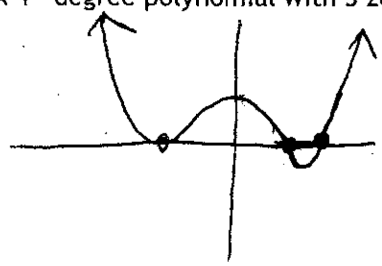
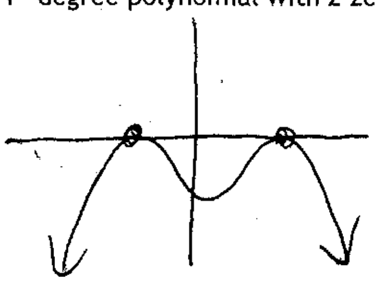
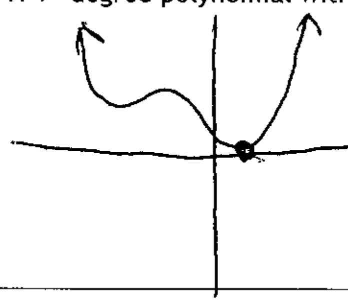
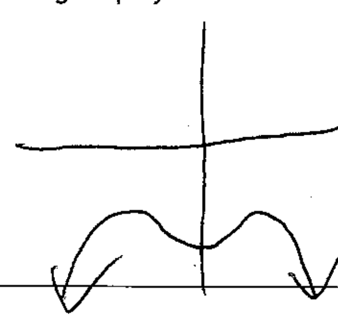
Name: ________________________ Per:_____
March 13/14, 2017

Define the following:

- Polynomial: "Many Terms" = An expression involving only numbers, x's, & whole number powers.
- Degree: The highest power of x (in standard form)
- Zero: = root = x-intercept.

1st degree	2nd degree	3rd degree	4th degree
			

Draw an example of each of the following:

A 2nd degree polynomial with no zeros 	A 2nd degree polynomial with 1 zero 	A 3rd degree polynomial with 2 zeros 
A 3rd degree polynomial with 1 zero 	A 3rd degree polynomial with no zeros Not Possible 	A 4th degree polynomial with 3 zeros 
A 4th degree polynomial with 2 zeros 	A 4th degree polynomial with 1 zero 	A 4th degree polynomial with no zeros 

What is the degree of the function $f(x) = 3x^2 - 4x + 5$

Degree = 2

Make a conjecture stating how many zeros are possible for a degree 3 polynomial.

Can have 1, 2, or 3.
Cannot have 0, because 3 is odd,
So one arm goes up, the other goes down.

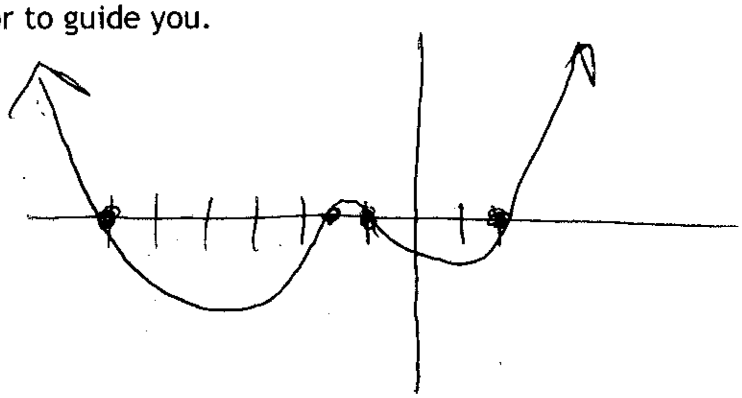
Consider the function $f(x) = (x-2)(x+1)(2x+3)(x+6)$.

a. What is the degree of f? 4

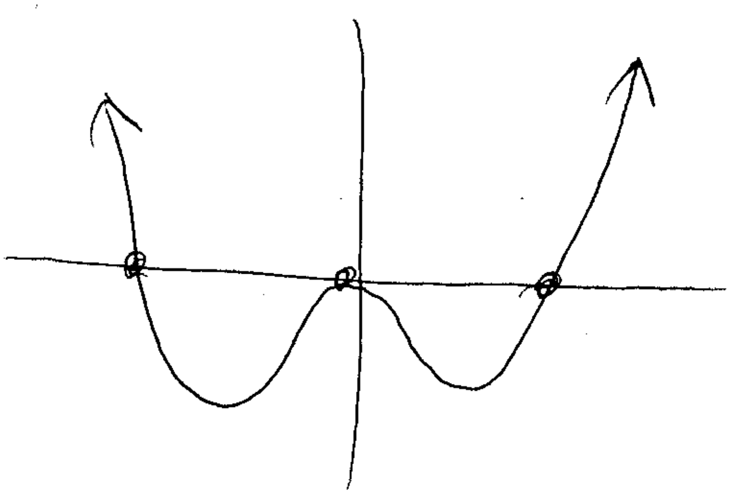
b. What is the leading term? $2x^4$

c. How many zeros does it have and what are they? 4 zeros. $x = 2, -1, -3/2, -6$

d. Sketch a rough graph of the function and feel free to use a graphing calculator to guide you.

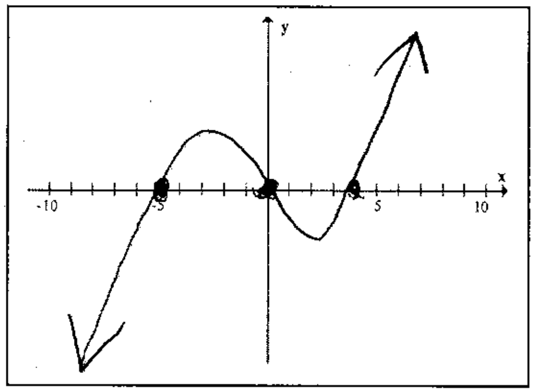


Draw a rough sketch of a degree 4 polynomial that has exactly 3 zeros.



1. Consider the function $y_1 = x(x+5)(x-4)$.

a. Draw a graph of y_1 in the window xmin= -10, xmax= 10, ymin= -30, ymax= 50.



Degree: 3

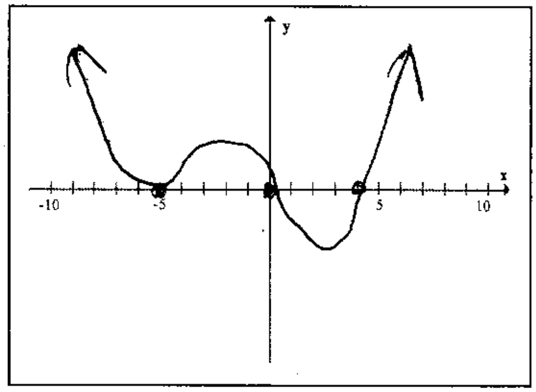
Leading Term: x^3

b. Where are the x intercepts?

0, -5, 4

2. Consider the function $y_2 = x(x+5)^2(x-4)$

a. Draw a graph of y_2 in the window xmin= -10, xmax= 10, ymin= -300, ymax= 300.



Degree: 4

Leading Term: x^4

b. Where are the x intercepts?

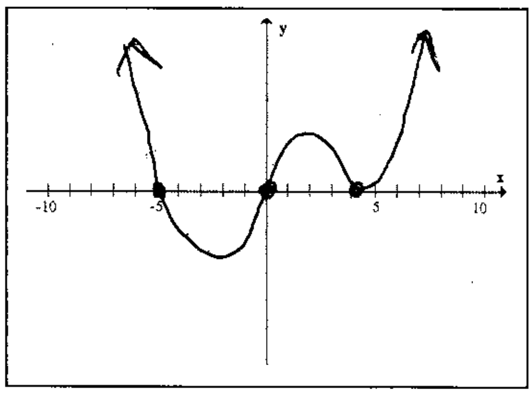
0, -5, 4

c. How are the graphs of y_1 and y_2 similar? How are they different?

Same zeros. Different degree & root behavior.

3. Consider the function $y_3 = x(x+5)(x-4)^2$

a. Draw a graph of y_3 in the window xmin= -10, xmax= 10, ymin= -300, ymax= 300.



Degree: 4

Leading Term: x^4

b. Where are the x intercepts?

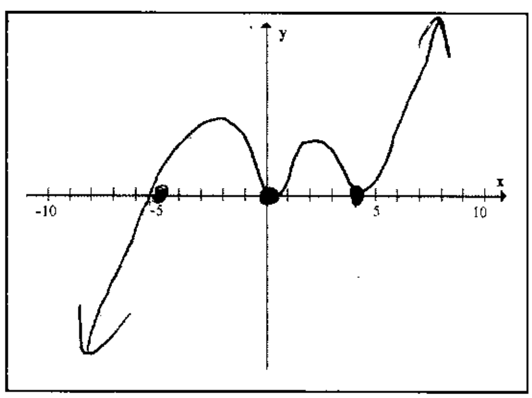
0, -5, 4

c. How are the graphs of y_1 and y_3 similar? How are they different?

Same zeros. Different root behavior.

4. Consider the function $y_4 = x^2(x+5)(x-4)^2$

a. Draw a graph of y_4 in the window xmin= -10, xmax= 10, ymin= -200, ymax= 1100.



Degree: 5

Leading Term: x^5

b. Where are the x intercepts?

0, -5, 4

c. How are the graphs of y_1, y_3, and y_4 similar? How are they different?

Same roots. Different degree & root behavior.

Multiplicity:

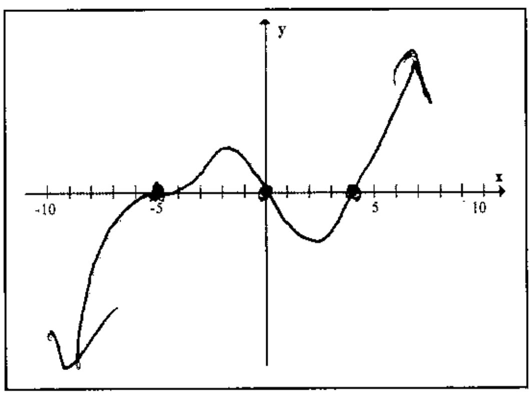
The # of times a factor is repeated. AKA The power of a factor.

Write a sentence or two that describes what happens to the graph of a polynomial near a root with an **even** multiplicity.

It bounces off the x-axis, Even multiplicities do not cross the x-axis

5. Consider the function $y_5 = x(x+5)^3(x-4)$

Draw a graph of y_5 in the window xmin= -10, xmax= 10, ymin= -1600, ymax= 400.

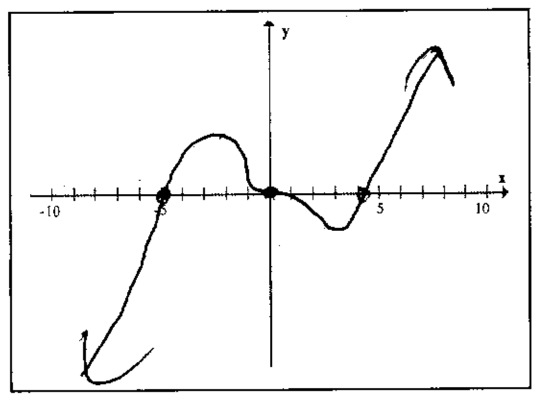


Degree: 5

Leading Term: x^5

6. Consider the function $y_6 = x^3(x+5)(x-4)$

Draw a graph of y_6 in the window xmin= -10, xmax= 10, ymin= -300, ymax= 600.



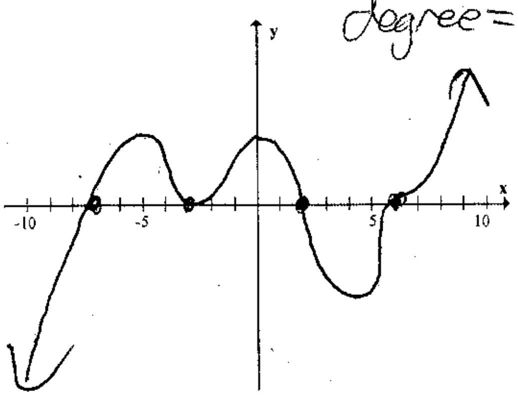
Degree: 5

Leading Term: x^5

Write a sentence or two that describes what happens to the graph of a polynomial near a root with an **odd** multiplicity. It passes through the x-axis. Odd multiplicities cross from negative to positive or viceversa

7. Make a rough sketch of each of the following polynomials **without** using a graphing calculator.

$y = (x+7)(x+3)^2(x-2)(x-6)^3$ degree = 7



$y = (x+8)^2(x+1)^3(x-3)(x-5)(x-8)$ degree = 8