Math 1050- 5.1 Notes:

1. *Identify a Polynomial Function and their Degree*

Polynomial Function:

a)

b)

c)

d)

e)

f)

Polynomial Graphs must be:

a)

b)

c)

d)

e)

f)

The **Power Function of degree** n is a monomial of the form:

Properties of Power Functions, $f(x) = x^n$, where n is an even integer:

1. Symmetric to the ________________
2. D: ____________ R: ______________
3. The ___________function always contains the points ________________
4. As *n* ______________ the graph will be ______________ in the middle

Evens resemble a _____________ and the higher the power the ________________ in the middle

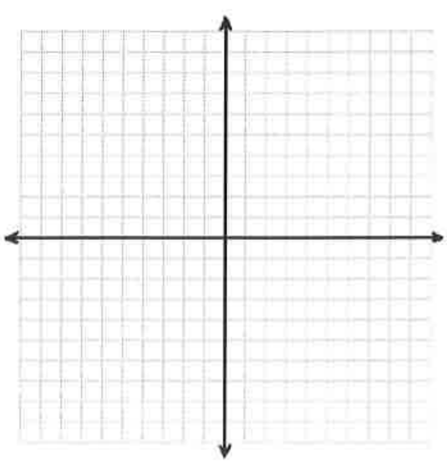
Properties of Power Functions, $f(x) = x^n$, where n is an odd integer:

1. Symmetric to the ________________
2. D: ____________ R: ______________
3. The ___________function always contains the points ________________
4. As *n* ______________ the graph will be ______________ in the middle

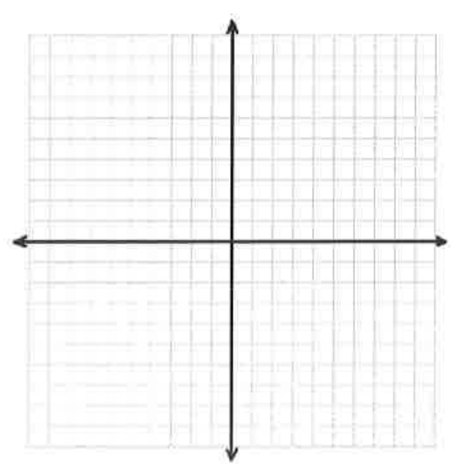
Odds resemble a _____________ and the higher the power the ________________ in the middle

2. *Graphing a Polynomial Function using Transformations*

$f(x) = 1 - x^5$



$f(x) = \frac{1}{2}(x-1)^4$



***3.** Identify the Real Zeros and Multiplicity*

Real Zero:	Turning Points (aka "the action"):
Based on the definition of "Real Zero", the following statements are equivalent:	

Examples: Creating a Polynomial Function from it's zeros

a) Find a polynomial of degree 3 whose zeros are -4, -2, and 3. b) Use a graphing utility to graph the polynomial function found in part a to verify your result.	a) Find a polynomial of degree 4 whose zeros are -2, -1 with a multiplicity of 2, and 1. b) Use a graphing utility to graph the polynomial function found in part a to verify your result.

Multiplicity (or Multiple Root):

$f(x) = -2(x-2)(x+1)^3(x-3)^4$

If Multiplicity is even: Then the Function ____________________the ____________________	If Multiplicity is odd: Then the Function ____________________the ____________________
Behavior Near a Zero: To find the behavior near a Zero you plug in the _______________ (zero) into the other ____________________	EX: How to find the Behavior Near a Zero: $x^3 - 2x^2$

End Behavior. For large values of x, either positive or negative, the graph of the polynomial _____________________________________ resembles the graph of the power function _______________.

Show end behavior with arrows

Making the Graph of a Polynomial:

Step 1: Determine the ______________________________ and recognize which parent function it will look like.

Step 2: Find the ____________________________

Step 3: Determine if the graph will ________________________ or ______________________ at the real zeros.

Step 4: Determine ______________________ number of turning Points.

Step 5: Behavior near each ____________________________ **

Step 6: Sketch the graph. Be sure to ______________________.

In Summary

Graph of a Polynomial Function $f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0 \quad a_n \neq 0$

Degree of the polynomial function f: n

Graph is smooth and continuous.

Maximum number of turning points: $n - 1$

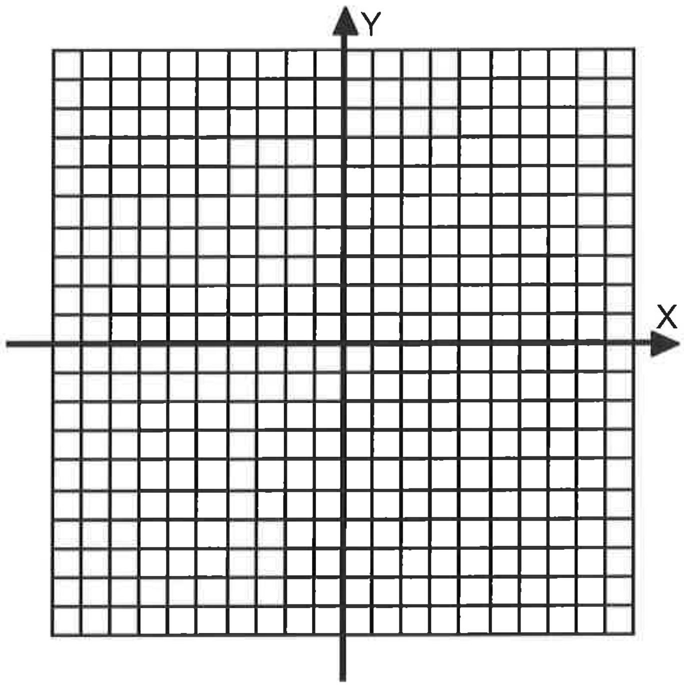
At a zero of even multiplicity: The graph of f touches the x-axis.

At a zero of odd multiplicity: The graph of f crosses the x-axis.

Between zeros, the graph of f is either above or below the x-axis.

End behavior: For large $|x|$, the graph of f behaves like the graph of $y = a_n x^n$.

Graph the Polynomial Function: $f(x) = (2x+1)(x-3)^2$	Graph the Polynomial Function: $f(x) = x^2(x-4)(x+1)$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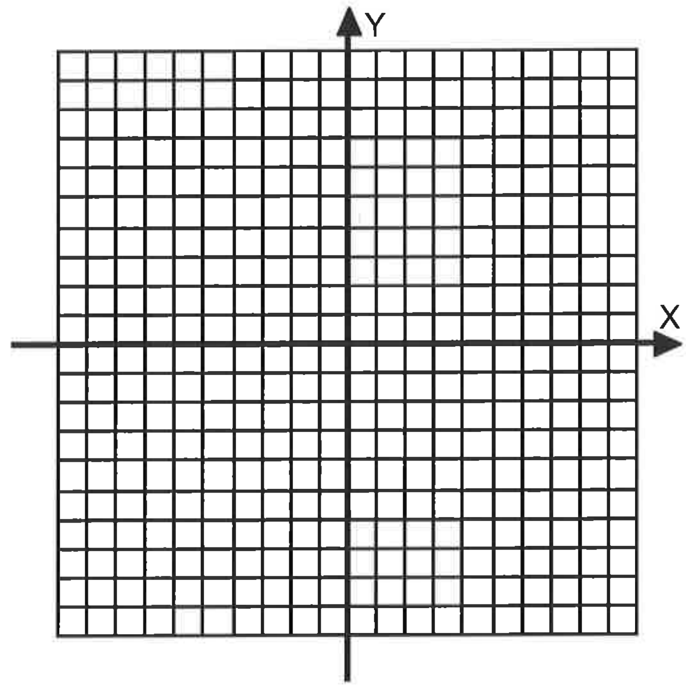
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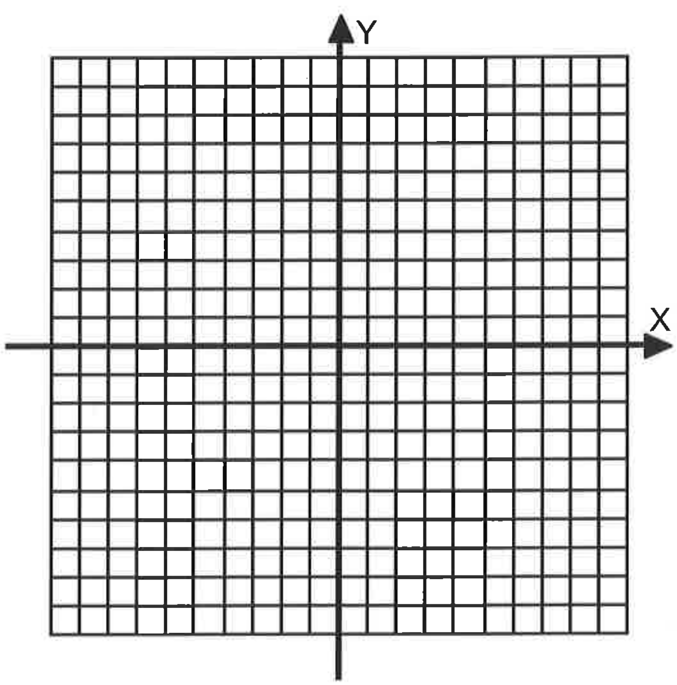
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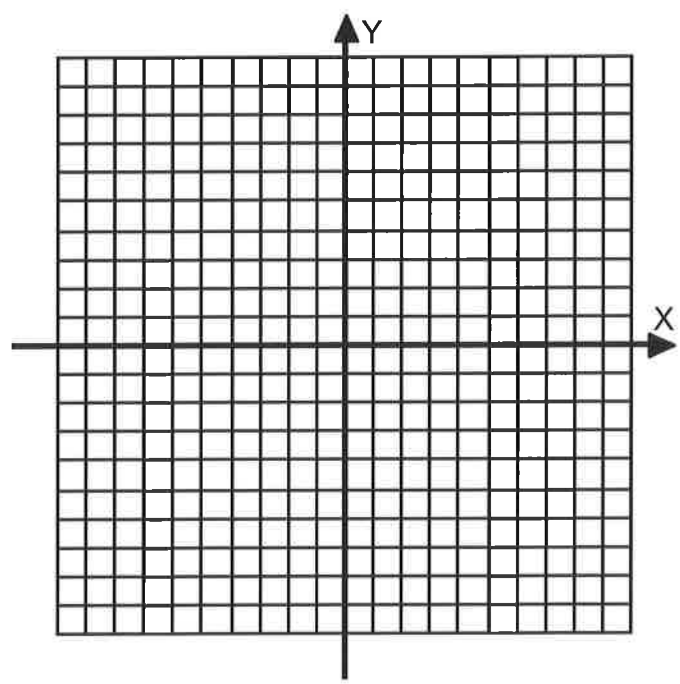
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