Notes 55 **Name _____**

Polynomial Functions and Their Graphs (2.3)

End Behavior of Polynomials (Leading Coefficient Test)

Example	Degree	Leading Coefficient	End Behavior	End Behavior	Best Graph Description

Leading Coefficient Test: Use the Leading Coefficient Test to determine the end behavior of the graph of the polynomials function.

1. $f(x) = x^3 - 2x^2 - 4x + 8$

2. $f(x) = -x^4 - 2x^2 - 5$

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

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

Analyzing Zeros (x-intercepts)

Multiplicity	x-intercept behavior	Graphic Representation

Find Zeros: Find the zeros for each polynomial function and give the multiplicity for each zero. State whether the graph crosses the *x*-axis, or touches the *x*-axis and turns around, at each zero.

5. $f(x) = x^3 - 2x^2 - 4x + 8$

6. $f(x) = -(x+5)^2(x-3)(x+1)^2$

Intermediate Value Theorem: Use the Intermediate Value Theorem to show that each polynomial has a real zero between the given integers.

7. $f(x) = x^3 - 4x^2 + 2;$ between 0 and 1

8. $f(x) = x^5 - x^3 - 1;$ between 1 and 2

Graphing Polynomial Functions

$$f(x) = a_n x^n + \cdots + a_1 x + a_0$$

a) ***Leading Coefficient Test:*** **Analyze the end behavior. (Ex: #'s 1-4)**

b) ***Find the x-intercepts:*** **Solve the polynomial and analyze the zeros. (Ex: #'s 5-6)**

c) ***Find the y-intercept:*** **Substitute 0 in for *x***

d) ***Determine the symmetry:*** **Is the function even (y-axis symmetry), odd (origin) symmetry, or neither.**

e) ***Find a few addition points and turning points:*** **Use a table of values if needed. The maximum number of turning points will be 1 LESS THAN THE DEGREE of the polynomial.**

9. $f(x) = -x^4 + 3x^3 - 3x^2 + 9x$

a) End Behavior **b) x-intercepts (solve)**	**c) y-intercepts** **d) Symmetry**
e) Graph