PreCalculus Notes **Polynomials**

Unit 2 Day 3 - (sections 2.1-2.6)

**Review:**

General form of a polynomial: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Types of Polynomials: Linear, Quadratics, Cubics, Quartics, …

Polynomials are “smooth and continuous” functions.

If degree is even: If degree is odd:

**Quadratics:**

Vertex= (h,k) Vertex Form: y = a(x – h)2 + k Axis of symmetry: x = h

Ex: Write the following in vertex form by completing the square. SHOW WORK.

1. y = x2 + 8x +2 b) y = x2 – 10x + 7

Vertex: Vertex:

Axis of Symmetry: Axis of Symmetry:

 c) y = 3x2 – 12x + 9 d) y = -2x2 + 2x +4

Vertex: Vertex:

Axis of Symmetry: Axis of Symmetry:

**Higher Order Polynomials:**

Rules:

* To find ALL the zeros of the function, use one real root found in the calculator to do synthetic division, then solve the remaining quadratic.
* Remainder Theorem: f(k) = the remainder when dividing a polynomial by (x – k).
* Factor Theorem: when f(k) = 0, x – k is a factor of f(x).
* When a zero is repeated, it has a multiplicity of 2. If a root occurs 3 times, multiplicity of 3…
* Fundmental Theorem of Algebra: The degree (*n*)= number of roots. *n* – 1 = maximum number of extrema.

Ex: Find the remainder when you divide x3 – 6x + 4 by x – 2. Is x – 2 a factor?

Ex 2: Find the remainder when you divide x27 – 1 by x + 1. Is x + 1 a factor?

Ex 3: f(x) = (x – 3)2(x + 5)3 Find the roots and state the multiplicity of each:

What is the degree? \_\_\_

# of zeros? \_\_\_\_

# of possible extrema? \_\_\_\_

Actual # of extrema? \_\_\_\_

End Behavior?

Ex 4:  Find the roots and state the multiplicity of each:

What is the degree? \_\_\_

# of zeros? \_\_\_\_

# of possible extrema? \_\_\_\_

Actual # of extrema? \_\_\_\_

End Behavior?

 Write the linear factorization:

Ex 5: $y=x^{3}-4x^{2}+9x-36$ Find the roots and state the multiplicity of each:

What is the degree? \_\_\_

# of zeros? \_\_\_\_

# of possible extrema? \_\_\_\_

Actual # of extrema? \_\_\_\_

End behavior?

 Write the linear factorization:

Ex 6: $f\left(x\right)=x^{4}+5x^{3}+7x^{2}+5x+6$ Find the roots and state the multiplicity of each:

What is the degree? \_\_\_

# of zeros? \_\_\_\_

# of possible extrema? \_\_\_\_

Actual # of extrema? \_\_\_\_

End behavior?

 Write the linear factorization: