2.3 – 2.4 Test Review

Name: _____
Date: _____ Hour: ___

End Behavior, Zeros, Extrema, Multiplicity and Division

1. **End Behavior:**

Degree	Leading Coefficient	$x \to -\infty$	$x \to +\infty$
Even	Positive	$f(x) \to$ _____	$f(x) \to$ _____
Even	Negative	$f(x) \to$ _____	$f(x) \to$ _____
Odd	Positive	$f(x) \to$ _____	$f(x) \to$ _____
Odd	Negative	$f(x) \to$ _____	$f(x) \to$ _____

A. State the end behavior for the following functions:

i. $f(x) = 3x^4 - 2x^2 + 1$ _____ and _____

ii. $f(x) = -1x^3 + 5x^2 + 2x - 7$ _____ and _____

iii. $f(x) = 4x^5 - 3x + 6$ _____ and _____

2. **Zeros, Extrema and Multiplicity:**

A. Where are zeros found on a graph?

_____.

B. What are extrema?

_____.

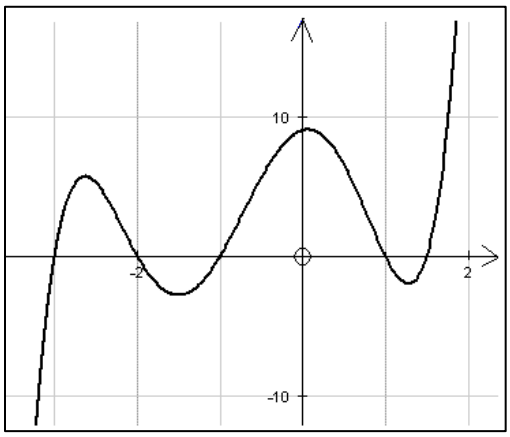
C. What is multiplicity?

_____.

i. Even: The graph _____ the x-axis.

ii. Odd: The graph _____ the x-axis.

D. Given a graph, state the following:



i. Number of Zeros: _____

ii. Number of Extrema: _____

iii. Function: $f(x) =$ _____

E. State the degree and zeros of the polynomial function. State the multiplicity of each zero and what the behavior of the graph is at that zero (crosses/kisses).

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

Degree: _____

Zeros	Multiplicity	Crosses/Kisses
$x =$		
$x =$		
$x =$		

3. **Long Division:** Divide $f(x)$ by $d(x)$.

$$f(x) = x^3 - 5x^2 + 3x - 15 \quad \text{and} \quad d(x) = x^2 + 3$$

PF: _____

FF: _____

4. Without dividing, is $(x-6)$ a factor of $x^3 - 6x^2 + 5x - 2$? **(Show what you did!!)**

5. What can the remainder theorem be used for? (Use it on #3).

6. **Synthetic Division:** Divide $3x^3 - 2x^2 + 3x - 4$ by $x - 3$

Final Equation:

_____

7. **Rational Zero Theorem:** Find all of the real zeros for the polynomial function:

$$f(x) = 2x^4 + 4x^3 - 41x^2 - 31x + 12$$

8. Extra Practice:
   1. Long and Synthetic Division:
      A. $f(x) = 2x^4 - 3x^3 + 9x^2 - 14x + 7$ and $d(x) = x^2 + 4$
      B. $f(x) = x^4 + 3x^3 + x^2 - 3x + 3$ and $d(x) = x + 2$
      C. $f(x) = 2x^3 - 7x^2 + 4x - 5$ and $d(x) = x - 3$