**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**November 27th, 2012**

**A.P. Calculus 1, Mrs. Sulkes**

**Curve Sketching and Critical Numbers**

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| --- |
| **Definition of Critical Number:** A number **a** in the domain of a given function f is called a critical number of f if f '(a) = 0 or f ' is undefined at x = a.  **Example 1:** Find the critical number(s) of the polynomial function f given by  f(x) = x 3 - 3x + 5  **Example 2:** Find the critical number(s) of the absolute value function f given by  f(x) = | x - 2 |  **Example 3:** Find the critical number(s) of function f whose first derivative is shown graphically below.  graph of derivative, example 3  **Example 4:** Find the critical number(s) of the rational function f defined by    **Example 5:** Find the critical number(s) of function f defined by    **Practice:**  Find the critical numbers of the functions:  a)  b)  c)  d)  e) |
|  |
|  |

**Why is finding the critical numbers important? Let’s explore.**

**Example 1:** Consider the following sign chart:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Intervals* |  | -5 | (-5,10) | 10 |  | 15 |  |
| *f*(x) | + | 0 | - | 0 | + | + | + |
|  | - | -2 | - | -6 | - | 0 | + |

1. Determine the intervals where is increasing.
2. Determine the intervals where is decreasing.
3. Sketch a possible graph for the function 
4. At what x-values does have a relative minimum? Relative maximum?

Example 2: Given the graph of sketched below.



1. On what interval(s) is ?
2. On what interval(s) is 
3. What are the critical numbers for 
4. On what interval(s) is  increasing?
5. On what interval(s) is  decreasing?
6. Sketch a possible graph of 

Example 3: Given 

1. Find the critical numbers.
2. Determine the interval(s) on which  is positive. Negative.
3. Determine the interval(s) on which is increasing. Decreasing.
4. Find the coordinates of any local maximum. Minimum.
5. Sketch the graph of 

Example 4: Given 

1. Find the critical numbers.
2. Determine the interval(s) on which  is positive. Negative.
3. Determine the interval(s) on which is increasing. Decreasing.
4. Find the coordinates of any local maximum. Minimum.
5. Sketch the graph of 