Chapter 4 – Part 1

Finding the Critical Number of a Function
1. Take the derivative.
2. Set it equal to zero. Solve for the zeroes. They are the critical numbers.
3. Determine where the derivative would be undefined (zero in the denominator). These points are critical numbers.

Find the Absolute Maximum and Minimums of a Function
1. Find the critical numbers of the function.
2. Calculate the value of the function at each critical number.
3. The lowest value is the absolute minimum. The highest is the absolute maximum.

Find the Intervals Where a Function is Increasing or Decreasing
1. Find the critical numbers.
2. Pick test values between the critical numbers and to the left and right of the critical numbers.
3. Calculate the value of the derivative at each test value.
4. If the derivative is +, the function is increasing on that interval.
   If the derivative is -, the function is decreasing on that interval.

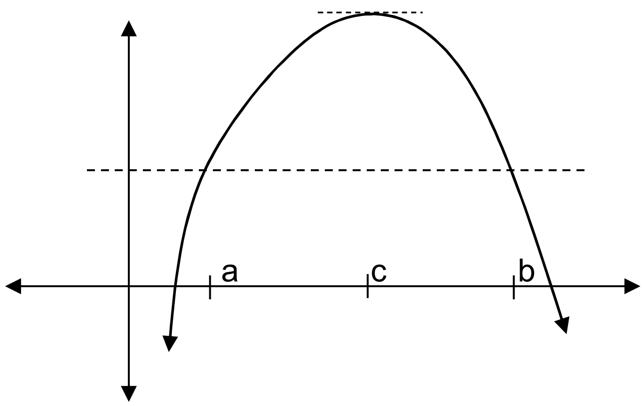
Find the Relative Maximum and Minimums of a Function
1. Find the intervals where the function is increasing and decreasing.
2. If the derivative changes from + to -, it's a maximum.
   If the derivative changes from – to +, it's a minimum.
   If the derivative doesn't change sign, it's neither.

Find the Inflection Points of a Function
1. Take the first derivative.
2. Take the second derivative.
3. Determine the points where the second derivative equals zero or is undefined. These are inflection points.

Determine the Concavity of a Function
1. Find the inflection points of a function.
2. Pick test values between these points and to the left and right of them.
3. Calculate the value of the second derivative at each test value.
4. If the second derivative is +, it is concave up on this interval.
   If the second derivative is -, it is concave down on this interval.

Use the 2nd Derivative Test to Find Extrema
1. Take the first derivative and find the critical numbers.
2. Take the second derivative.
3. Find the value of the second derivative at each critical number.
4. If f" is positive, the point is a relative minimum.
   If f" is negative, the point is a relative maximum.

Rolle's Theorem
If a function is continuous and differentiable between point a and point b, and if f(a) = f(b), then somewhere in between a and b, there exists at least one point c where the slope is zero.



Mean Value Theorem
If function is continuous and differentiable between point a and b, then somewhere in between a and b, there's a point c that has the same slope as the slope between a and b.

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$