**AP Calculus AB  
Stuff You Must Know**

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| **Algebra Stuff** | **Trig Stuff Identities** |
| Slope:  Point-slope form:  Standard Form:  Distance Formula:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Trig Values**   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |

**Differential Calculus Formulas and Rules**

  

**Applications of the first and second derivative**

Curve Sketching

* To find a critical value, set  or undefined
* Use a sign chart to determine if the function has a relative extrema. Make sure you write sentences summarizing the results.
* Use can also use the Second Derivative Test to verify extrema. Suppose that  is a critical value. If  then is the *x-*coordinate of the relative maximum. If  then is the *x-*coordinate of the relative minimum.
* To find points of inflection, set  or undefined. Then, show that the sign of  changes as *x* passes through that point.

**Three Important Theorems**

**Intermediate Value Theorem**

If a function,  is continuous on a closed interval [a, b] and *y* is some value between  and  then there exists at least one value  in the open interval (a, b) where 

In other words, a continuous function must pass through every *y*-value between  and .

**Mean Value Theorem**

If a function,  is continuous on a closed interval [a, b] AND is differentiable on an open interval (a, b), then there exists at least one value  in the open interval (a, b) where 

In other words, there is at least one point on a smooth curve where the tangent line can be drawn so that it is parallel to the secant line drawn through the endpoints of the interval.

**Rolle’s Theorem**

If a function,  is continuous on a closed interval [a, b] AND is differentiable on an open interval (a, b) AND , then there exists at least one value  in the open interval (a, b) where 

In other words, if the endpoints of a differentiable function have the same *y*-coordinates, there is at least one point inside the interval where the slope of the tangent line is equal to zero. This is a special case of the Mean Value Theorem.

**Integral Formulas**

  

(Integration by parts)

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| **Fundamental Theorem of**  **Calculus – Part 1** | **Fundamental Theorem of Calculus – Part 2** | **Average Value Theorem** |
|  |  | If a function  is continuous on the closed interval [a, b], then there exists some number  such that |
| **Volume of a Solid of Revolution (disk method)** | **Volume of a Solid with a Known Cross-Section** |  |
| **Particle Motion Formulas** | | |
|  |  |  |
|  |  | Final Position = |