

AP Calculus AB
Unit 2 – Differentiation
Are you ready for the test???

Are you ready for the test??...Are you sure???...Well, let's find out...

- Can you explain the difference between Average ROC and Instantaneous ROC...
 - Verbally?
 - Numerically?
 - Graphically?
 - Algebraically?
 - Standing on your head while reciting the alphabet backwards?
- Can you calculate the average ROC of a function and the instantaneous ROC of a function...
 - Numerically?
 - Algebraically?
 - From a given table of values?
- Can you find the average velocity and the instantaneous velocity given a displacement function?
- Can you use the limit definition of the derivative to find the derivative of a function...
 - For all x , i.e. $f'(x)$?
 - At $x = a$, i.e. $f'(a)$?
- Can you recognize the function being differentiated when given the limit definition of the derivative?
- Can you differentiate the following...
 - Constants?
 - Polynomials?
 - Trig. Functions?
 - Exponentials?
 - Logarithms?
 - Inverse Trig. Functions?
- Can you use the following rules to differentiate specific functions and functions defined for select values of x ?
 - Product rule?
 - Quotient rule?
 - Chain rule?
 - Sum/Difference rule?
 - Constant Multiple rule?

- Can you find the 2nd, 3rd, 4th, ..., 100th derivative of $f(x)$?
- Can you use Natural Logs to differentiate complicated functions? What about Synthetic logs, can you use them?
- Can you explain what $f[g(x)] = x$ tells you about $f(x)$ and $g(x)$?
- Can you find the derivative of $f^{-1}(b)$ given $f'(a)$ and if (a, b) is a point on $f(x)$?
- Can you prove the following?
 - Differentiability of $f(x)$ at a given point?
 - Continuity of $f(x)$ at a given point?
- Can you explain Local Linearity of a function and its connection to differentiability and linear approximation?
- Can you explain why *One Direction* is sooooo bad??? No? That's ok...no one can!!
- Can you find the equation of the tangent/normal line to $f(x)$ at a given point?
- Can you use the Linear Approximation to $f(x)$ at $x = a$ to find $f(a \pm h)$ for small h ?
- Can you use the Chain rule to differentiate a function...
 - With respect to time?
 - Implicitly?
- Can you use a Chain Saw to divide a log into 2 equal halves??
- Can you find equations of horizontal/vertical tangent lines to implicitly defined curves?
- Can you solve related rate problems involving...
 - Pythagoras?
 - Similar Triangles?
 - Trig. Functions?
- Can you state the formulas for the areas and volumes of common shapes and solids?
- Can you recognize the graph of $f'(x)$ given the graph of $f(x)$ and vice versa?

Well...can you do all of the above???

Of course you can!!!! 😊

(Except explain why *One Direction* is sooooooo bad!!)