AP Calculus Unit 2 Study Guide

1. Know the difference between average rate of change (secant lines) & instantaneous rate of change (tangent lines).

2. Be able to find the slopes at 2 points $m = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$

3. Be able to find the slopes at 1 point $m = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

4. Be able to write the equation of the secant line and/or equation of the tangent line using slope-intercept form $y = mx + b$ and point-slope form $y - y_1 = m(x - x_1)$.

5. Be able to find the derivative of a function using the limit definition $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

6. Know the reason why the derivative function is important. Remember the process of the finding the derivative is differentiation.

7. Know how to determine whether a function is differentiable.

8. Know the difference between differentiability, continuity & limits existing.

9. Know and understand the concept behind continuity whereas using the 3 requirements of being continuous to prove or disprove continuity. Also be able to evaluate continuity graphically & algebraically. (Go back & look at 1.4)

10. Be able to estimate the slopes of tangent lines using numerical evidence (tables)

11. Know how to find the equation of the normal curve of the tangent line.

$m = a$

$\perp m = -\frac{1}{a}$ ← normal curve gives the perpendicular slope (opposite sign reciprocal slope)

12. Be able find slopes between 2 points & at 1 point by using a data table (Warm up 2's)

Know how to do the following in the calculator:

13. graph a function (or multiple functions in the calculator).

14. produce a table of values from a function

15. estimate the slopes of tangent lines

HINT FOR TEST

Be able to find tangent slopes of complicated functions by using a calculator whereas inputing the function & numerically analyzing the small intervals of secant slopes to get the tangent line by producing a table.

(i.e.) $f(x) = \sqrt{x}$ at 1

$\lim_{h \to 0} \frac{\sqrt{1+h} - \sqrt{1}}{h}$ → evaluate slope algebraically.

$f(x) = e^x$ at $x = 1$

$\lim_{x \to 0} \frac{e^{1+h} - e^1}{h}$ → too complicated to evaluate algebraic, so calculator must be used to estimate slope numerically.