AP Calculus Unit 3 Study Guide

1. Know the power, product, quotient & chain rules; be able to apply them appropriately. [3.1-3.6]

$$\frac{d}{dx}[x^n] = nx^{n-1} \qquad \frac{d}{dx}(f \cdot g) = f \cdot g' + g \cdot f' \qquad \frac{d}{dx}\left(\frac{f}{g}\right) = \frac{g \cdot f' - f \cdot g'}{g^2}$$

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$$

2. Know the derivatives of trigonometric functions [3.5]

$$\frac{d}{dx}(\sin x) = \cos x \qquad \frac{d}{dx}(\cos x) = -\sin x \qquad \frac{d}{dx}(\tan x) = \sec^2 x \qquad \frac{d}{dx}(\csc x) = -\csc x \cot x$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x \qquad \frac{d}{dx}(\cot x) = -\csc^2 x$$

3. Know how to evaluate trig functions by using "trig chart" or unit circle [Trig Review]

4. Be able to find the slope of tangent lines using the differentiation.

5. Understand the meanings of position function, velocity function & acceleration function. [3.4]

position function $\rightarrow s(t)$
velocity function $\rightarrow v(t) = s'(t)$
acceleration function $\rightarrow a(t) = v'(t) = s''(t)$

6. Be able to implicitly differentiate functions, find slopes of tangent lines & equations of tangent line. [3.7]

7. Be able to find derivatives for exponential & logarithmic functions [3.8 - 3.9]

$$\frac{d}{dx}\left[e^{f(x)}\right] = e^{f(x)} \cdot f'(x)$$

$$\frac{d}{dx}\left[\ln(f(x))\right] = \frac{1}{f(x)} \cdot f'(x)$$

$$\frac{d}{dx}\left[a^{f(x)}\right] = a^{f(x)} \ln(a) \cdot f'(x)$$

$$\frac{d}{dx}\left[\log_a f(x)\right] = \frac{1}{(\ln a) f(x)} \cdot f'(x)$$

8. Be able to find slopes of tangent lines using a table of values & be able to differentiate "abstract" functions.

9. Be able to find equations of the <u>normal</u> curve from a function at a point.

10. Know how to find slopes at one point using the calculator.