

AP Calculus BC Unit 2 Study Guide

1. Know the power, product, quotient and chain rules; be able to apply them appropriately.

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

2. Know the derivatives of trigonometric functions and inverse trigonometric functions.

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

$$\frac{d}{dx} \sin^{-1}(f(x)) = \frac{1}{\sqrt{1-(f(x))^2}} \cdot f'(x) \quad \frac{d}{dx} \cos^{-1}(f(x)) = \frac{-1}{\sqrt{1-(f(x))^2}} \cdot f'(x) \quad \frac{d}{dx} \tan^{-1}(f(x)) = \frac{1}{1+(f(x))^2} \cdot f'(x)$$

3. Know how to evaluate trig functions by using the unit circle.

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

5. Understand the meanings of position function, velocity function and acceleration function.

6. Be able to implicitly differentiate functions, find slopes of tangent lines and equations of tangent lines.

7. Be able to find derivatives of exponential and logarithmic functions.

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

8. Be able to find slopes of tangent lines using a table of values and be able to differentiate “abstract” functions.

9. Be able to find equations of the **normal** curve from a function at a point.

10. Be able to logarithmic differentiate functions (“the last resort differentiation”).

Know how to do the following in the calculator:

- (everything from last unit study guide)
- Find slopes at one point using the calculator.

EXAM FORMAT – 90 minutes

Part A – no calculator (no more than 55 minutes)

Section I: Multiple Choice

Section II: Free Response

Part B – Calculator (at least 35 minutes)

Section I: Multiple Choice

Section II: Free Response