AP Calculus Name:_____ Period:____
Reading Assignment Guide 1 Unit 5 – Antiderivatives

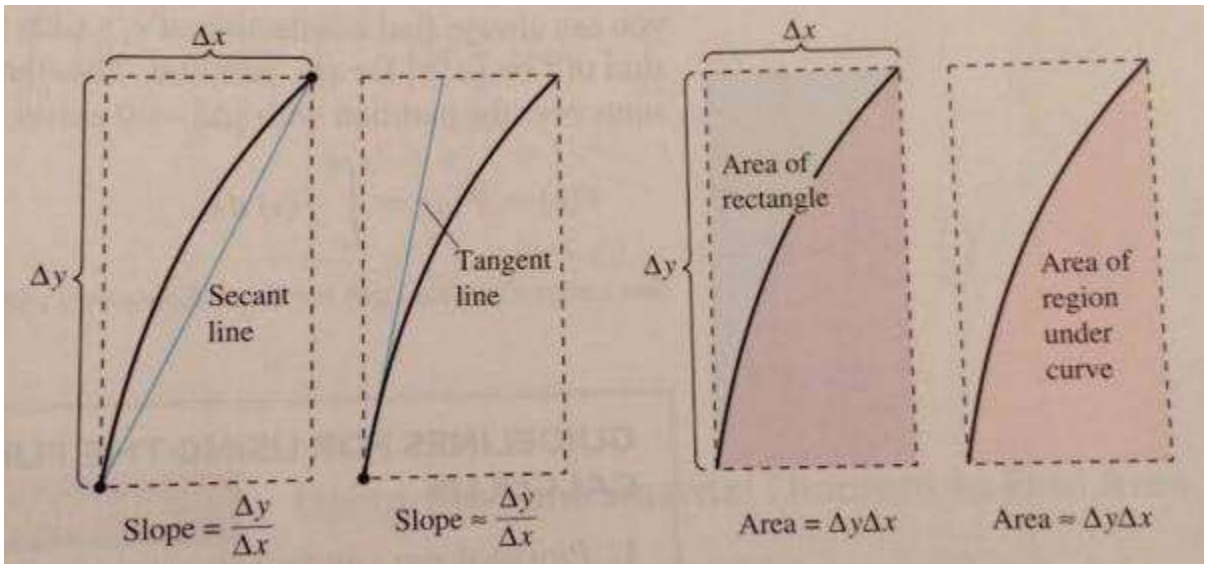
Section 4.4 The Fundamental Theorem of Calculus

Objective: In this lesson you learned how to evaluate a definite integral using the Fundamental Theorem of Calculus.

I. The Fundamental Theorem of Calculus (Pages 277-279)

You have now been introduced to the two major branches of calculus: _____ (introduced with the tangent line problem) and _____ (introduced with the area problem).

Informally, the theorem states that differentiation and (definite) integration are _____, in the same sense that division and multiplication are inverse operations. The slope of the tangent line was defined using the _____ (the slope of the secant line). Similarly, the area of a region under a curve was defined using the _____ (the area of a rectangle).



The Fundamental Theorem of Calculus

If a function f is continuous on the closed interval $[a, b]$ and F is an antiderivative of f on the interval $[a, b]$ **,** then

$$\int_a^b f(x)\,dx = \_\_\_\_\_$$

GUIDELINES FOR USING THE FUNDAMENTAL THEOREM OF CALCULUS

1. _____ an antiderivative of f , you now have a way to evaluate a definite integral without _____.

2. When applying the _____, the notation shown below is convenient.

$$\int_a^b f(x)\,dx = \_\_\_\_\_ = \_\_\_\_\_$$

For instance, to evaluate $\int_1^4 x^2\,dx$, you can write

$$\int_1^4 x^2\,dx = \_\_\_\_\_ = \_\_\_\_\_ = \_\_\_\_\_$$

3. It is not necessary to include a constant of integration *C* in the antiderivative.

$$\int_a^b f(x)\,dx = \_\_\_\_\_ = \_\_\_\_\_ = \_\_\_\_\_$$

Example 1: ***a***. $\int_1^4 (x^2 - 4)\,dx$ ***b***. $\int_1^4 2\sqrt{x}\,dx$ ***c***. $\int_{\pi/4}^{\pi/3} \sec^2 x\,dx$

Example 2: A Definite Integral Involving Absolute Value

Evaluate $\int_0^4 |3x - 1|\,dx$