AP Calculus Name:_____ Period:____
Reading Assignment Guide 3 Unit 6 – Understanding Integrals

Section 4.4 2nd Fundamental Theorem of Calculus

Objective: In this lesson you learned how to use the Mean Value Theorem for Integrals, the Average Value of a Function over a closed interval, and the 2nd Fundamental Theorem of Calculus..

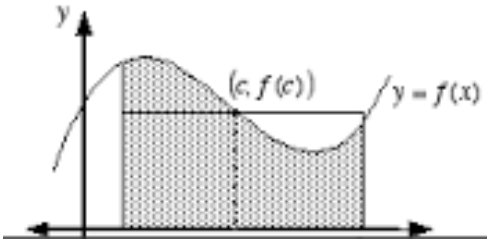
The Fundamental Theorem of Calculus (p. 278)

Let f be continuous on the closed interval [a, b] and let F be an antiderivative of f on the interval [a, b], then

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

Mean Value Theorem for Integrals (p. 280)

If f is _____[a,b], then there exists a number c in the closed interval [a, b] such that



Definition of the Average Value of a Function on an Interval (p. 281)

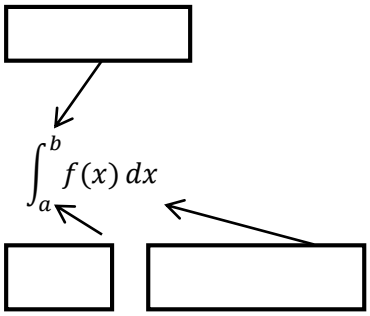
If f is integrable on the closed interval [a, b], then the **average value of f on the interval is**

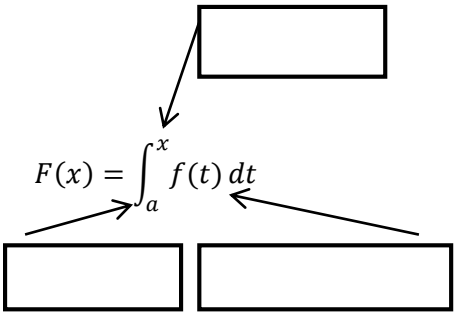
Average Value = _____.

Note: Notice in the above diagram that the area of the region under the graph of f is equal to the area of the rectangle whose height is the average value.

Example: Find the average value of $f(x) = x^2 + 1$ on the interval from [1, 5]

The Definite Integral as a Number p. 283 *The Definite Integral as a Function of x*





The Second Fundamental Theorem of Calculus (p.283)

If f is continuous on an open interval I containing a, then, for every x in the interval,

$$\frac{d}{dx}\left[\int \_\_\_\_\_\right] = \_\_\_\_\_$$