CALCULUS 12 **THE FUNDAMENTAL THEOREM OF CALCULUS**

Part 1:

If f is continuous on [a,b], then the function $F(x) = \int_a^x f(t)dt$

has a derivative at every point x in [a,b], and

$$\frac{dF}{dx} = \frac{d}{dx}\int_a^x f(t)dt = f(x)$$

- Every continuous function f is the derivative of some other function
- Every continuous function has an antiderivative
- The process of integration and differentiation are inverse of one another

Part 2:

If f is continuous at every point of [a,b], and if F is any antiderivative of f on [a,b], then

$$\int_a^b f(x)dx = F(b) - F(a)$$

This part of the Fundamental Theorem of Calculus is also called the INTEGRAL EVALUATION THEOREM.

Note: Any bounded function with a finite number of points of discontinuity on an interval [a,b] is integrable on the interval if it is continuous everywhere else.