

- **The Fundamental Theorem of Calculus, First Form:** Let f be continuous on an open interval I containing a . The function A_f defined by

$$A_f(x) = \int_a^x f(t) dt$$

is defined for all $x \in I$ and $\frac{d}{dx}(A_f(x)) = f(x)$. That is, A_f is an *antiderivative* of f .

- **Consequence:** If f is continuous, then f has an antiderivative, A_f . This doesn't tell us how to find it, only that it exists.
1. **FTC (Second Form):** Let f be continuous on $[a, b]$, and let F be **any** antiderivative of f . Then

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