

The Fundamental Theorem of Calculus, Part I. If $F(x)$ is an antiderivative for $f(x)$, then

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

(2) Use the Fundamental Theorem of Calculus Part II to evaluate the following integrals.

(a) $\int_0^3 x^3 dx$

(b) $\int_{\pi}^{3\pi/2} \cos(x) dx$

(c) $\int_e^{e^2} \frac{1}{x} dx$

The Fundamental Theorem of Calculus, Part II. If f is continuous on $[a, b]$, then for every x in $[a, b]$,

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

(1) For the following problems, use the Fundamental Theorem of Calculus Part I to find $F'(x)$.

(a) $F(x) = \int_1^x \sqrt[4]{t} dt$

(b) $F(x) = \int_x^0 \sec^3 t dt$

(c) $F(x) = \int_2^{x^2} \frac{1}{t^3} dt$. (Don't forget the chain rule!)

(d) $F(x) = \int_{-x}^{3x} \sqrt{t^2 + 1} dt$