

* FTC Part 2:

If f is continuous on $[a, b]$, then the function

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

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

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

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

★ Derivative of an Integral

★ Derivative matches upper limit of integration

★ Lower limit is a constant

$$\text{Ex 1) } \frac{d}{dx} \int_{-\pi}^x \cos t dt =$$

$$\frac{d}{dx} (\sin t \Big|_{-\pi}^x) = \frac{d}{dx} (\sin x - \sin(-\pi))$$

$$= \frac{d}{dx} (\sin x - 0) = \frac{d}{dx} (\sin x) = \cos x$$