Example

Find $F'(x)$ and $F'(2)$ if

$$F(x) = \int_{s}^{x} \frac{t}{t^2 + 3} \, dt.$$  

Solution: For $f$ continuous on an interval containing $a$ and $x$, we know that

$$\frac{d}{dx} \int_{a}^{x} f(t) \, dt = f(x).$$

So for the problem at hand,

$$F'(x) = \frac{d}{dx} \int_{s}^{x} \frac{t}{t^2 + 3} \, dt = \frac{x}{x^2 + 3}.$$  

Thus

$$F'(2) = \frac{2}{2^2 + 3} = \frac{2}{7}.$$