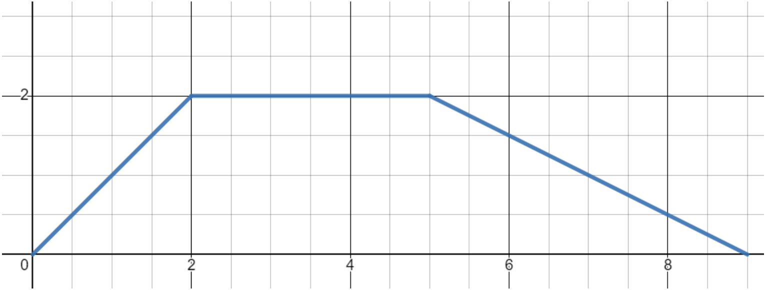
Bellwork 1/10

Graph of f



Let $g(x) = \int_5^x f(s)ds$. Evaluate the following:

$g(0)$, $g(2)$, $g(9)$

reset

Exercise 1

$$f(x) = \int_{-5}^{x} e\,dt$$

Find $f(5)$ using part 2 of the FTC.

Exercise 1 - Solution

$$f(5) = \int_{-5}^{5} e dt$$

The antiderivative of $\int e dt$ is $et + C$ for some constant C.

$$\text{FTC 2} \implies \int_{-5}^{5} e dt = e(5) - e(-5)$$

$$= \boxed{10e}$$

Exercise 2

$$g(x) = \int_{\frac{\pi}{4}}^{x} \csc^2(\theta)\, d\theta$$

Find $g(\frac{\pi}{3})$ using part 2 of the FTC.

Exercise 2 - Solution

$$g\left(\frac{\pi}{3}\right) = \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \csc^2(\theta)\, d\theta$$

The antiderivative of $\int \csc^2(\theta)\, d\theta$ is $-\cot(\theta) + C$.

$$\text{FTC 2} \implies \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \csc^2(\theta)\, d\theta = \left[-\cot\left(\frac{\pi}{3}\right)\right] - \left[-\cot\left(\frac{\pi}{4}\right)\right]$$

$$= \boxed{-\frac{\sqrt{3}}{3} + 1}$$

Exercise 3

$$h(x) = \int_0^x \left(2\sin t - e^t\right)\,dt$$

Find $h(3)$ using part 2 of the FTC.

Exercise 3 - Solution

$$h(3) = \int_0^3 \left(2\sin t - e^t\right)\,dt$$

The antiderivative of $\int (2\sin t - e^t)\,dt$ is $-2\cos(t) - e^t + C$.

$$\text{FTC 2} \implies \int_0^3 \left(2\sin t - e^t\right)\,dt = [-2\cos(3) - e^3] - [-2\cos(0) - e^0]$$
$$= \boxed{3 - e^3 - 2\cos(3)}$$