4. (12 points) Suppose that \( h(x) \) is a continuous function. Suppose also that \( H(x) \) is an antiderivative of \( h(x) \).

(a) (3 pts.) What can you say about the relationship between \( H(x) \) and \( \int_a^x h(t) \, dt \)?

\( H(x) \) and \( \int_a^x h(t) \, dt \) are both antiderivatives of \( h(x) \), so they differ by a constant.

(b) (3 pts.) Calculate \( \frac{d}{dx} \int_a^x h(t) \, dt \).

\( h(x) \)

(c) (3 pts.) Calculate \( \frac{d}{dx} \left( \int_a^b h(x) \, dx \right) \).

\( 0 \)

(a definite integral is a constant.)

(d) (3 pts.) Calculate \( \int_a^b \left( \frac{d}{dx} h(x) \right) \, dx \).

\( h(b) - h(a) \)