Note The textbook leaves out something important, the indefinite integral also called the anti-derivative.

By the FTC I we have $\int_a^b g'(x)\,dx = g(b) - g(a)$.

We can write this as $\int_a^b f(x)\,dx = F(b) - F(a)$

where $F'(x) = f(x)$. The function F is said to be an anti-derivative of f. For any constant C, $F(x) + C$ is also an anti-derivative of $f(x)$.

In fact we know $\{F(x) + C \mid C \in \mathbb{R}\}$ is the set of all functions whose derivative is $f(x)$. This leads us to write

$$\int f(x)\,dx = F(x) + C$$

where $F'(x) = f(x)$. It is called the indefinite integral.