Exercise 24

Evaluate the integral.

$$\int_1^8 x^{-2/3}\,dx$$

Solution

According to part 2 of the fundamental theorem of calculus,

$$\int_a^b f(x)\,dx = F(b) - F(a),$$

where F is an antiderivative of f. Use the power rule in reverse here: Bump up the exponent by 1 and divide by that exponent.

$$\begin{aligned}
\int_1^8 x^{-2/3}\,dx &= \left(\frac{x^{1/3}}{\frac{1}{3}}\right)\Bigg|_1^8 \\
&= (3x^{1/3})\Big|_1^8 \\
&= 3(8^{1/3} - 1^{1/3}) \\
&= 3(2-1) \\
&= 3
\end{aligned}$$