

### 5.3 EVALUATING DEFINITE INTEGRALS

**EXAMPLE A** Evaluate  $\int_3^6 \frac{dx}{x}$ .

**SOLUTION** The given integral is an abbreviation for

$$\int_3^6 \frac{1}{x} dx$$

An antiderivative of  $f(x) = 1/x$  is  $F(x) = \ln |x|$  and, because  $3 \leq x \leq 6$ , we can write  $F(x) = \ln x$ . So

$$\begin{aligned} \int_3^6 \frac{1}{x} dx &= \ln x \Big|_3^6 = \ln 6 - \ln 3 \\ &= \ln \frac{6}{3} = \ln 2 \end{aligned}$$

**EXAMPLE B** Evaluate  $\int \frac{\cos \theta}{\sin^2 \theta} d\theta$ .

**SOLUTION** This indefinite integral isn't immediately apparent in Table 1, so we use trigonometric identities to rewrite the function before integrating:

$$\begin{aligned} \int \frac{\cos \theta}{\sin^2 \theta} d\theta &= \int \left( \frac{1}{\sin \theta} \right) \left( \frac{\cos \theta}{\sin \theta} \right) d\theta \\ &= \int \csc \theta \cot \theta d\theta = -\csc \theta + C \end{aligned}$$