| 5.3 | **EVALUATING DEFINITE INTEGRALS** |

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

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 $3 \leqslant x \leqslant 6$, we can write $F(x) = \ln x$. So

$$\int_3^6 \frac{1}{x}\, dx = \ln x \Big]_3^6 = \ln 6 - \ln 3$$

$$= \ln \frac{6}{3} = \ln 2 \qquad ■$$

EXAMPLE B Evaluate $\int \dfrac{\cos \theta}{\sin^2 \theta}\, d\theta$.

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

$$\int \frac{\cos \theta}{\sin^2 \theta}\, d\theta = \int \left(\frac{1}{\sin \theta} \right) \left(\frac{\cos \theta}{\sin \theta} \right) d\theta$$

$$= \int \csc \theta \cot \theta\, d\theta = -\csc \theta + C \qquad ■$$