

Exercise 293

For the following exercises, use the change-of-base formula and either base 10 or base e to evaluate the given expressions. Answer in exact form and in approximate form, rounding to four decimal places.

$$\log_7 82$$

Solution

In order to evaluate this expression, set it equal to an unknown variable x .

$$\log_7 82 = x$$

The base is 7, the exponent is x , and the result is 82.

$$7^x = 82$$

To solve for x , take the logarithm of both sides (ln or log—it doesn't matter).

$$\log 7^x = \log 82$$

Use the property of logarithms that brings the exponent down in front.

$$x \log 7 = \log 82$$

Divide both sides by $\log 7$ to solve for x .

$$x = \frac{\log 82}{\log 7} \approx 2.2646$$