

Exercise 297

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.

$$\log_{0.2} 0.452$$

Solution

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

$$\log_{0.2} 0.452 = x$$

The base is 0.2, the exponent is x , and the result is 0.452.

$$0.2^x = 0.452$$

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

$$\ln 0.2^x = \ln 0.452$$

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

$$x \ln 0.2 = \ln 0.452$$

Divide both sides by $\ln 0.2$ to solve for x .

$$x = \frac{\ln 0.452}{\ln 0.2} \approx 0.4934$$