Exercise 294

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.

$$\log_6 103$$

Solution

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

$$\log_6 103 = x$$

The base is 6, the exponent is x, and the result is 103.

$$6^x = 103$$

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

$$\ln 6^x = \ln 103$$

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

$$x \ln 6 = \ln 103$$

Divide both sides by $\ln 6$ to solve for x.

$$x = \frac{\ln 103}{\ln 6} \approx 2.5867$$