

- 1 Solve the equation

$$2^{-x} = 16.$$

(Show at least one intermediate step.)

I want to get 16 by multiplying and dividing 2; I find that $16 = 2 \cdot 2 \cdot 2 \cdot 2 = 2^4$. Now I can solve the equation:

$$\begin{aligned}2^{-x} &= 16; \\2^{-x} &= 2^4; \\-x &= 4; \\x &= -4.\end{aligned}$$

- 2 Evaluate $\log_{10} \sqrt{10}$. (Show at least one intermediate step not using a calculator.)

If $x = \log_{10} \sqrt{10}$, this means the same as $10^x = \sqrt{10}$. Now I can solve this like I did the previous problem:

$$\begin{aligned}10^x &= \sqrt{10}; \\10^x &= 10^{1/2}; \\x &= \frac{1}{2}.\end{aligned}$$

In other words,

$$\log_{10} \sqrt{10} = \frac{1}{2}.$$

- 3 Find the domain of the function f given by

$$f(x) = \ln(x - 3).$$

(Show at least one intermediate step.)

We can only take logarithms of positive numbers:

$$\begin{aligned}x - 3 &> 0; \\x &> 3.\end{aligned}$$

In other words, the domain is

$$\text{dom } f = (3, \infty).$$