

$$\textcircled{1} \log_2(5x) = 4$$

$$2^4 = 5x$$

$$16 = 5x$$

$$\frac{16}{5} = x$$

(2)

$$3 \log_2(x-1) + \log_2 4 = 5$$

$$\log_2 4(x-1)^3 = 5$$

(Note: The number 2 in the subscript is circled in orange, and an orange arrow labeled "bump" points from it to the exponent 3.)

$$\begin{array}{r} 2^5 = 4(x-1)^3 \\ 32 = 4(x-1)^3 \\ \hline 4 \qquad \qquad \qquad 4 \end{array}$$

(Note: Yellow brackets are drawn under the 4 in the denominator of the first fraction and the 4 in the denominator of the second fraction.)

$$\sqrt{8} = \sqrt{(x-1)^2}$$

$$2 = x-1$$

$$3 = x$$

$$\textcircled{3} \log x + \log(x+15) = 2$$

$$\log x(x+15) = 2$$

$$10^2 = x^2 + 15x$$

-

$$100 = x^2 + 15x$$

$$0 = x^2 + 15x - 100$$

$$0 = (x + 20)(x - 5)$$

$$x = -20$$

$$x = 5$$

extraneous



4

$$5^{x-2} = 8$$

$$\ln 5^{x-2} = \ln 8$$

$$\frac{(x-2) \ln 5}{\ln 5} = \frac{\ln 8}{\ln 5}$$

$$x-2 = \frac{\ln 8}{\ln 5}$$

$$x \approx 3.29$$

$$x = \frac{\ln 8}{\ln 5} + 2$$

or

$$x = \log_5 8 + 2$$

5

$$4^{x-3} = 7^x$$

$$\ln 4^{x-3} = \ln 7^x$$

$$(x-3) \ln 4 = x \ln 7$$

$$x \ln 4 - 3 \ln 4 = x \ln 7$$

$$x \ln 4 - x \ln 7 = 3 \ln 4$$

$$x (\ln 4 - \ln 7) = 3 \ln 4$$

$$\frac{x \left(\ln \frac{4}{7} \right)}{\left(\ln \frac{4}{7} \right)} = \frac{\ln 4^3}{\ln \frac{4}{7}}$$

$$x = \frac{\ln 64}{\ln \left(\frac{4}{7} \right)} \text{ EXACT}$$

$$x \approx -7.43 \text{ APPROX.}$$