

4-5 Exponential and Logarithmic Equations and Inequalities

Example 2D: Solving Logarithmic Equations

Solve.

$$\log_{12} x + \log_{12} (x + 1) = 1$$

$$\log_{12} x(x+1) = 1$$

$$\log_{12} x^2 + x = 1$$

$$x^2 + x = 12$$

$$x^2 + x - 12 = 0$$

$$(x+4)(x-3) = 0$$

$$x = \cancel{4} \text{ (3)}$$

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Check It Out! Example 2a

Solve.

$$\textcircled{2A} \quad 3 = \log 8 + \underline{3} \log x$$

$$x = 5$$

$$3 = \log 8 + \log x^3$$

$$3 = \log_8 x^3 \rightarrow 10^3 = 8x^3$$

$$\begin{aligned} 10^3 &= 8x^3 & \text{OR} & \frac{10^3}{8} = x^3 \\ x^3 &= 125 & & \\ x &= 5 & & \end{aligned}$$

$$\textcircled{2B} \quad 2 \log \textcircled{x} - \log 4 = 0$$

$$\textcircled{x=2}$$

$$\log x^2 - \log 4 = 0$$

$$\begin{aligned} \log \frac{x^2}{4} &= 0 \rightarrow 10^0 = \frac{x^2}{4} \\ 1 &= \frac{x^2}{4} \\ x^2 &= 4 \quad x^{\pm 2} \end{aligned}$$