

$$50e^{0.035x} = 200$$

$$e^{0.035x} = 4$$

$$\ln 4 = 0.035x$$

$$\frac{\ln 4}{0.035} = x$$

$$\begin{aligned}\ln &= \log_e \\ \log &= \log_{10}\end{aligned}$$

$$\textcircled{17} \quad 3 \ln(x-3) + 4 = 5$$

$$3 \ln(x-3) = 1$$

$$\ln(x-3) = \frac{1}{3}$$

$$e^{\frac{1}{3}} = x-3$$

$$3 + e^{\frac{1}{3}} = x$$

$$\textcircled{29} \quad \frac{2^x - 2^{-x}}{3} = 4$$

$$2^x - 2^{-x} = 12$$

multiply by 2^x

$$2^x 2^x - 1 = 12 \cdot 2^x$$

$$(2^x)^2 - 12 \cdot 2^x - 1 = 0$$

$$(y)^2 - 12y - 1 = 0$$

$$a = 1, b = -12, c = -1$$

29. Multiply both sides by $3 \cdot 2^x$, leaving $(2^x)^2 - 1 = 12 \cdot 2^x$,
or $(2^x)^2 - 12 \cdot 2^x - 1 = 0$. This is quadratic in 2^x ,

leading to $2^x = \frac{12 \pm \sqrt{144 + 4}}{2} = 6 \pm \sqrt{37}$. Only

$6 + \sqrt{37}$ is positive, so the only answer is

$$x = \frac{\ln(6 + \sqrt{37})}{\ln 2} = \log_2(6 + \sqrt{37}) \approx 3.5949.$$

$$2^x = 12.08$$

$$x \log 2 = \log 12.08$$

$$x = \frac{\log 12.08}{\log 2} \approx 3.5949$$

$$\textcircled{37} \quad \ln(x-3) + \ln(x+4) = 3 \ln 2$$

$$\ln[(x-3)(x+4)] = \ln[2^3]$$

$$(x-3)(x+4) = 8$$

$$x^2 + x - 12 = 8$$

$$x^2 + x - 20 = 0$$

$$(x-4)(x+5) = 0$$

$$x = +4, \text{ or } x = -5$$

$$\begin{aligned} \ln x &= \ln y \\ x &= y \end{aligned}$$

check: only $x=4$ works.

$$(35) \quad \frac{1}{2} \ln(x+3) - \ln(x) = 0$$

$$\ln(x+3)^{\frac{1}{2}} = \ln x$$

$$(x+3)^{\frac{1}{2}} = x$$

$$\sqrt{x+3} = x$$

$$(\sqrt{x+3})^2 = x^2$$

$$x+3 = x^2$$

$$x^2 - x - 3 = 0$$

$$x = \frac{1 \pm \sqrt{1+12}}{2} \Rightarrow x = \frac{1 \pm \sqrt{13}}{2}$$

only $x = \frac{1 + \sqrt{13}}{2}$

$$\textcircled{33} \quad \frac{500}{1 + 25e^{0.3x}} = \frac{200}{1}$$

$$\frac{500}{200} = 1 + 25e^{0.3x}$$

$$\frac{5}{2} - 1 = 25e^{0.3x}$$

$$\frac{3}{50} = e^{0.3x}$$

$$\ln\left(\frac{3}{50}\right) = 0.3x$$

$$x = \frac{\ln\left(\frac{3}{50}\right)}{0.3} = \frac{10}{3} \ln\left(\frac{3}{50}\right)$$