

p 505 1-8, 26-42, 47-51  
exclude 30

Key

①  $e^x = \ln 30$

$$\boxed{x = \ln 30}$$

②  $\ln x = 42$

$$\boxed{x = e^{42}}$$

③  $e^3 = \ln x$

$$\boxed{\ln x = 3}$$

④  $e^{\ln 18} = e^x$

$$\boxed{e^x = 18}$$

⑤  $3\ln 2 + 2\ln 4$

$$\ln 2^3 + \ln 4^2$$

$$\ln(8 \cdot 16)$$

$$\boxed{\ln 128}$$

⑥  $5\ln 3 - 2\ln 9$

$$\ln 3^5 - \ln 9^2$$

$$\ln\left(\frac{243}{81}\right)$$

$$\boxed{\ln 3}$$

⑦  $3\ln 6 + 2\ln 9$

$$\ln 6^3 + \ln 9^2$$

$$\ln(216 \cdot 81)$$

$$\boxed{\ln 17496}$$

⑧  $3\ln 5 + 4\ln x$

$$\ln 5^3 + \ln x^4$$

$$\boxed{\ln(125x^4)}$$

⑫  $e^{-2} = \ln x^6$

$$-2 = \ln x^6$$

$$\boxed{-2 = 6\ln x}$$

⑰  $e \ln e^x = e^7$

$$\boxed{e^x = e^7}$$

⑲  $\ln 125 - 2\ln 5$

$$\ln 125 - \ln 5^2$$

$$\ln\left(\frac{125}{25}\right)$$

$$\boxed{\ln 5}$$

⑳  $3\ln 10 + 2\ln 100$

$$\ln 10^3 + \ln 100^2$$

$$\ln(1000 \cdot 10000)$$

$$\boxed{\ln 10000000}$$

$$\textcircled{30} \quad 4 \ln \frac{1}{3} - 6 \ln \frac{1}{9}$$

$$\ln \left(\frac{1}{3}\right)^4 - \ln \left(\frac{1}{9}\right)^6$$

$$\ln \frac{1}{81} - \ln \frac{1}{531441}$$

$$\ln \left(\frac{1}{81} \cdot \frac{531441}{1}\right)$$

$$\ln 6561$$

$$\ln 3^8 = \boxed{8 \ln 3}$$

$$\ln \left(\frac{1}{3}\right)^{-8}$$

$$\boxed{-8 \ln \frac{1}{3}}$$

$$\textcircled{31} \quad 7 \ln \frac{1}{2} + 5 \ln 2$$

$$\ln \left(\frac{1}{2}\right)^7 + \ln 2^5$$

$$\ln \left(\frac{1}{128} \cdot 32\right)$$

$$\boxed{\ln \frac{1}{4}}$$

$$\textcircled{32} \quad 8 \ln x - 4 \ln 5$$

$$\ln x^8 - \ln 5^4$$

$$\boxed{\ln \left(\frac{x^8}{625}\right)}$$

$$\textcircled{33} \quad 3 \ln x^2 + 4 \ln 3$$

$$\ln x^6 + \ln 3^4$$

$$\ln (x^6 \cdot 81)$$

$$\boxed{\ln 81x^6}$$

$$\textcircled{34} \quad \ln e^x - 3 = 35$$

$$\begin{array}{r} +3 \\ +3 \end{array}$$

$$\ln e^x = \frac{38}{6}$$

$$\ln e^x = \ln \frac{19}{3}$$

$$\boxed{x = \ln \frac{19}{3}}$$

$$\textcircled{35} \quad 4e^x + 2 = 180$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$\frac{4e^x}{4} = \frac{178}{4}$$

$$\ln e^x = \ln \frac{89}{2}$$

$$\boxed{x = \ln \frac{89}{2}}$$

$$(36) 3e^{2x} - 5 = -4$$

$$\begin{array}{r} +5 \\ \hline \end{array}$$

$$3e^{2x} = 1$$

$$\ln e^{2x} = \ln \frac{1}{3}$$

$$\frac{2x}{2} = \frac{\ln \frac{1}{3}}{2}$$

$$x = \frac{\ln \frac{1}{3}}{2}$$

$$(37) -2e^{3x} + 19 = 3$$

$$\begin{array}{r} -19 \\ \hline \end{array}$$

$$-2e^{3x} = -16$$

$$\ln e^{3x} = \ln 8$$

$$\frac{3x}{3} = \frac{\ln 8}{3}$$

$$x = \frac{\ln 8}{3}$$

$$(38) 6e^{4x} + 7 = 4$$

$$\begin{array}{r} -7 \\ \hline \end{array}$$

$$6e^{4x} = -3$$

$$\ln e^{4x} = \ln \frac{-1}{2}$$

No Solution

$$(39) -4e^{-x} + 9 = 2$$

$$\begin{array}{r} -9 \\ \hline \end{array}$$

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

$$\ln e^{-x} = \ln \frac{7}{4}$$

$$\frac{-x}{-1} = \frac{\ln \frac{7}{4}}{-1}$$

$$x = \frac{\ln \frac{7}{4}}{-1}$$

$$(40) a) v(t) = 18500e^{-.186(1.5)}$$

$$= 18500e^{-.279}$$

$$v(1.5) = \$13996$$

$$b) 9250 = 18500e^{-.186t}$$

$$\frac{9250}{18500} = e^{-.186t}$$

$$\ln 5 = \ln e^{-.186t}$$

$$\frac{\ln 5}{-.186} = \frac{-.186t}{-.186}$$

$$t = 3.73$$

About 3.73 yrs

$$c) 1000 < 18500e^{-.186t}$$

$$\frac{1000}{18500} < e^{-.186t}$$

$$\ln .0541 < \ln e^{-.186t}$$

$$\frac{\ln .0541}{-.186} < \frac{-.186t}{-.186}$$

$$t > 15.68$$

About 15.68 years

$$(41) \ln e^x \leq \ln 8.7$$

$$x \leq \ln 8.7$$

$$(42) \ln e^x \geq \ln 42.1$$

$$x \geq \ln 42.1$$

$$(47) A = 800e^{(.045)(5)}$$

$$= 800e^{.225}$$

$$= \$1001.86$$

$$(48) \ln 12x^2$$

$$\ln 12 + \ln x^2$$

$$\ln 12 + 2\ln x$$

$$(49) \frac{1600}{800} = \frac{800e^{.045t}}{800}$$

$$\ln 2 = .045t$$

$$\frac{\ln 2}{.045} = \frac{.045t}{.045}$$

$$t = 15.4 \text{ yrd}$$

$$(50) \ln \frac{16}{125}$$

$$\ln 16 - \ln 125$$

$$(51) \ln \sqrt[5]{x^3}$$

$$\ln x^{\frac{3}{5}}$$

$$\frac{3}{5} \ln x$$

$$(52) \frac{1600}{800} = \frac{800e^{9r}}{800}$$

$$\ln 2 = 9r$$

$$\frac{\ln 2}{9} = \frac{9r}{9}$$

$$r = .077 \text{ } 7.7\%$$

$$(53) \ln xy^4z^{-3}$$

$$\ln x + \ln y^4 + \ln z^{-3}$$

$$\ln x + 4\ln y - 3\ln z$$

$$(54) 10000 = Pe^{(.0475)(12)}$$

$$\frac{10000}{e^{.57}} = \frac{Pe^{.57}}{e^{.57}}$$

$$P = \text{about } \$5655.25$$