

$$75. \quad \ln x - \ln(x+1) = 2$$

$$\ln\left(\frac{x}{x+1}\right) = 2$$

$$e^{\cancel{\ln}\left(\frac{x}{x+1}\right)} = e^2$$

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

$$x = e^{2x} x + e^2$$

$$x - e^2 x = e^2$$

factor

$$x(1 - e^2) = e^2$$

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

$$x = 1.157$$

Check

$$\ln x - \ln(x+1) = e^2$$

$$\ln(-1.157)$$

No Solution

$$a^x = a^y \quad x = y$$

$$4^x = 16$$

$$4^{\textcircled{x}} = 4^{\textcircled{2}} \quad x = 2$$

$$\log_a x = \log_a y \quad x = y$$

$$a^{\log_a x} = x$$

$$\log_a a^x = x$$

$$\ln x - \ln 3 = 0$$

$$\ln x = \ln 3$$

$$x = 3$$

$$e^x = 7$$

$$\ln e^x = \ln 7$$

$$x = \ln 7 \quad \text{Calc}$$

$$x \approx 1.946$$

$$\ln x = -3$$

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

$$x \approx .0498$$

$$\log x = -1$$

$$10^{\log x} = 10^{-1}$$

$$e^x + 5 = 60$$

$$e^x = 55$$

$$\ln e^x = \ln 55$$

$$x = 4.007$$

$$2(3^{2t-5}) - 4 = 11$$

$$\frac{2(3^{2t-5})}{2} = \frac{15}{2}$$

$$3^{2t-5} = 7.5$$

$$\log_3 3^{2t-5} = \log_3 7.5$$

$$2t-5 = \frac{\log 7.5}{\log 3} \quad \text{Change of Base}$$

$$2t-5 = 1.834$$

$$\frac{2t}{2} = \frac{6.834}{2}$$

$$t \approx 3.417$$

Quadratic Form

$$e^{2x} - 3e^x + 2 = 0$$

$$(e^x)^2 - 3e^x + 2 = 0$$

Factor

$$(e^x - 2)(e^x - 1) = 0$$

$$e^x - 2 = 0 \quad e^x - 1 = 0$$

$$e^x = 2$$

$$e^x = 1$$

$$\ln e^x = \ln 2$$

$$\ln e^x = \ln 1$$

$$x = .6931$$

$$x = 0$$

5. p228

$$4^{2x-1} = 64$$

$$4^{\cancel{2x-1}} = 4^{\cancel{3}}$$

$$a^x = a^y$$

$$x = y$$

$$2x-1 = 3$$

$$x = 2$$

p 228

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$$\left(1 + \frac{.065}{365}\right)^{365t} = 4$$

$$(1.000178)^{365t} = 4$$

Power
Rule

$$\ln (1.000178)^{365t} = \ln 4$$

$$365t (\ln 1.000178) = \ln 4$$

$$\frac{365t}{\ln 1.000178} = \frac{\ln 4}{\ln 1.000178}$$

$$365t = 7,785.269$$

$$\frac{365}{365} \quad \frac{7,785.269}{365}$$

$$t = 21.3295$$

$$85 \quad \log_4 x - \log_4 (x-1) = \frac{1}{2}$$

Quotient
Rule

$$\log_4 \frac{x}{x-1} = \frac{1}{2}$$

$$4^{\cancel{\log_4} \frac{x}{x-1}} = 4^{\frac{1}{2}}$$

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

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

$$-x = -2$$

$$x = 2$$

$$77. \quad \ln x + \ln (x-2) = 1$$

Product
Rule

$$\ln [x(x-2)] = 1$$

$$e^{\ln [x(x-2)]} = e^1$$

$$x^2 - 2x - e = 0$$

$$x^2 - 2x - 2.718 = 0$$

Quadratic
Formula

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$$2e^x = 10$$
$$\frac{2}{2} = \frac{10}{2}$$

$$e^x = 5$$

$$\ln e^x = \ln 5$$

$$x = 1.609$$

$$53 \quad \frac{500}{100 - e^{\frac{x}{2}}} = 20 \quad (100 \cdot e^{\frac{x}{2}})$$

$$500 = 20 (100 - e^{\frac{x}{2}})$$

$$\overline{20} \quad \overline{20}$$

$$25 = 100 - e^{\frac{x}{2}}$$

$$-75 = -e^{\frac{x}{2}}$$

$$\overline{-1} \quad \overline{-1}$$

$$75 = e^{\frac{x}{2}}$$

$$\ln 75 = \ln e^{\frac{x}{2}}$$

$$2 \cdot 4.317 = \frac{x}{2} \cdot 2$$

$$8.635 = x$$