4.2 # 87b $8906.54 \cdot e^{0.05 \cdot 9} = 8906.54 \cdot e^{0.45} \approx \$13,968.24$

89.	91.
$25,000 = P(1+.06/4)^{11}$ $25,000 = P(1.015)^{11}$ $P = \dfrac{25,000}{(1.015)^{11}} = \$21,223.33$	$5,000 = P(1+.035/4)^{10 \cdot 4}$ $5,000 = P(1.00875)^{40}$ $P = \dfrac{5000}{(1.00875)^{40}}$ $P = \$3528.81$

4.3 # 63 $\log_2 \dfrac{6x}{y} = \log_2 6 + \log_2 x - \log_2 y$

67. $\log_4(2x+5y)$ can't be rewritten in a different form. (log rules don't apply to +)

69.

$$\log_m \sqrt{\frac{5r^3}{z^5}} = \log_m \left(\frac{5r^3}{z^5}\right)^{1/2} = \frac{1}{2}\log_m \frac{5r^3}{z^5} = \frac{1}{2}\left(\log_m 5 + \log_m r^3 - \log_m z^5\right)$$

$$= \frac{1}{2}\left(\log_m 5 + 3\log_m r - 5\log_m z\right) = \frac{1}{2}\log_m 5 + \frac{3}{2}\log_m r - \frac{5}{2}\log_m z$$

71. $\log_2 \dfrac{ab}{cd} = \log_2 a + \log_2 b - \log_2 c - \log_2 d$

73. $\log_3 \dfrac{\sqrt{x}\sqrt[3]{y}}{w^2\sqrt{z}} = \log_3 \dfrac{x^{1/2}y^{1/3}}{w^2 z^{1/2}} = \log_3 x^{1/2} + \log_3 y^{1/3} - \log_3 w^2 - \log_3 z^{1/2} = \dfrac{1}{2}\log_3 x + \dfrac{1}{3}\log_3 y - 2\log_3 w - \dfrac{1}{2}\log_3 z$

77. $\log_a m - \log_a n - \log_a t = \log_a \left(\dfrac{m}{nt}\right)$

79.

$$\frac{1}{3}\log_b x^4y^5 - \frac{3}{4}\log_b x^2y = \log_b \left(x^4y^5\right)^{1/3} - \log_b \left(x^2y\right)^{3/4} = \log_b \frac{\left(x^4y^5\right)^{1/3}}{\left(x^2y\right)^{3/4}}$$

$$= \log_b \frac{x^{4/3}y^{5/3}}{x^{3/2}y^{3/4}} = \log_b \frac{y^{5/3-3/4}}{x^{3/2-4/3}} = \log_b \frac{y^{20/12-9/12}}{x^{9/6-8/6}} = \log_b \frac{y^{11/12}}{x^{1/6}}$$

81. $2\log_a(z+1) + \log_a(3z+2) = \log_a(z+1)^2 + \log_a(3z+2) = \log_a\left((z+1)^2(3z+2)\right)$

4.4 # 11. $\log 10^{12} = \log_{10} 10^{12} = 12$

15. Use your calculator to get $\log(63) = 1.7993$

17. Use your calculator to get log(0.0022) = -2.6576

19. $\log(387 \cdot 23) = \log(8901) = 3.9494$

23. $\log(387) + \log(23) = 2.5877 + 1.3617 = 3.9494$

27. They are the same because the multiplication/addition logarithm rule says they must be equal.

45. $\ln e^{1.6} = \log_e e^{1.6} = 1.6$

49. $\ln \frac{1}{e^2} = \ln 1 - \ln e^2 = 0 - 2 = -2$

51. Use a calculator to get ln(0.00013) = -8.9480