Sec 4.1 4, 8, 11, 14, 19, 22, 26, 29, 31, 34, 37, 38, 41, 49

4) $P(t) = 200(0.985)^{t/3}$
a) 197.
b) 190.1738
c) 199.9496
d) 198.8847

8) Graph of b) is a vertical shift down of the graph of a) by 12 units.
y-intercept of $y = 5^x - 12$ is $y = 1 - 12 = -11$
Asymptote is $y = -12$.

11) Graph of b) is a horizontal shift left of the graph of a) by one unit.
y-intercept is $y = -2^{0+1} = -2$
Asymptote is $y = 0$.

14) Graph of b) is a vertical compression by $\frac{1}{2}$ of the graph of a).
y-intercept is $y = \frac{1}{2}(4.8)^0 = \frac{1}{2}$
asymptote is $y = 0$.

19) $\$400\left(1 + \frac{0.06}{1}\right)^{1.4} = \$504.99$

22) $\$350\left(1 + \frac{0.075}{12}\right)^{12 \cdot 20} = \$1561.29$

26) $\$20000 = A_0\left(1 + \frac{0.08}{4}\right)^{4 \cdot 3}$

$$\rightarrow A_0 = \frac{\$20,000}{\left(1 + \frac{0.08}{4}\right)^{4.3}} = \$15,769.86$$

29) $\$1200 = \$1000(1+r)^2 \rightarrow 1.2 = (1+r)^2$

$\rightarrow \sqrt{1.2} = 1+r \rightarrow r = \sqrt{1.2} - 1$

$\rightarrow \underline{r = 9.54\%}$

31) $(0,1)$: $1 = kb^0 = k \Rightarrow \underline{k=1}$

$(-1,3)$: $3 = 1 \cdot b^{-1} \rightarrow \frac{1}{b} = 3 \Rightarrow \underline{b = \frac{1}{3}}$

34) $(0,2)$: $2 = k \cdot b^0 = k \Rightarrow \underline{k=2}$

$(1,6)$: $6 = 2 \cdot b^1 = 2b \Rightarrow \underline{b=3}$

37) a) 38 years $\rightarrow$ Population doubles
$\rightarrow \underline{11.6 \text{ billion}}$.

76 years $\rightarrow$ Population doubles again.
$\rightarrow \underline{23.2 \text{ billion}}$

b) $A(t) = 5.8 \ (2)^{\frac{t}{38}}$ (billion people)

c) $A(5) = 6.4$ billion.

38) a) 10 years $\rightarrow$ Population halves
$\rightarrow 61$ million

20 years $\rightarrow$ Population halves again
$\rightarrow \underline{30.5 \text{ million}}$

b) $A(t) = 122 \left(\frac{1}{2}\right)^{t/10}$ (million insects)

c) $A(14) = 46.2$ million

41) a) $P(t) = 18(2)^{\frac{t}{8.4}}$

b) $P(2010-1995) = 18 \cdot 2^{\frac{15}{8.4}} = \underline{62.\text{(million}}$

49) a) $I(x) = I_0(1-0.20)^x$

b) $I(15) = 6000(1-0.20)^{15} = 211$ watts per square meter