3.4

20 a) Let $P(t)$ denote the population after t hours.

$$P(0) = 100$$

In t hours there are $t/2$ "tripling periods"

So $P(t) = 100 \cdot 3^{t/2}$

Check: $t = 2 \rightsquigarrow P(2) = 100 \cdot 3^{2/2} = 100 \cdot 3 = 300$

b) $p(1) = 100 \cdot 3^{1/2} = 100\sqrt{3}$

3.4

21. Remember:

If interest on a principal P is

- compounded $\underline{n}$ times a year
- at an annual rate $\underline{r}$
- after $\underline{t}$ years

you have $P(1 + r/n)^{nt}$ in your bank account.

So in this problem

- $P = \$700$
- $n = 52$
- $r = .06 = 6\%$
- $t = 10$

$$700\left(1 + \frac{.06}{52}\right)^{52 \cdot 10}$$

$\underline{3.5}$

7. $\ln y = 4 \rightsquigarrow e^{\ln y} = e^4$

$\rightsquigarrow y = e^4$

10. $\ln x = -3 \rightsquigarrow e^{\ln x} = e^{-3}$

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

15. $e^{3x-1} = 2$

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

$\to 3x - 1 = \ln 2$

$3x = (\ln 2) + 1$

$x = \dfrac{\ln 2 + 1}{3}$

18. $\ln(x+4) - \ln(x-2) = 3$

$\to \ln \dfrac{x+4}{x-2} = 3$

$\to \dfrac{x+4}{x-2} = e^3$

$\to x + 4 = e^3(x-2)$

$\to x + 4 = e^3 x - 2e^3$

$x - e^3 x = -2e^3 - 4$

$x(1-e^3) = -2e^3 - 4$

$x = \dfrac{-2e^3 - 1}{1 - e^3}$

3.5

24. $e^{2x} - 4e^{x} = 12$

$\rightarrow e^{2x} - 4e^{x} - 12 = 0$. Let $t = e^{x}$

$t^2 - 4t - 12 = 0$

$(t-6)(t+2) = 0$

$t = 6$ $\qquad$ $t = -2$

$e^{x} = 6$ $\qquad$ $\cancel{e^{x} = -2}$

$\rightarrow \ln e^{x} = \ln 6$

$x = \ln 6.$