1. $1800 = 600e^{k(2)}$

$3 = e^{2k}$

$\ln 3 = 2k$

$k = \frac{\ln 3}{2}$

$y = y_0 e^{\frac{t\ln 3}{2}}$

$y = 600e^{\frac{4\ln 3}{2}}$

$y = 5400$ bacteria

2. $4 = \frac{\ln 2}{k}$

$k = \frac{\ln 2}{4}$

$30(20) = 600 = y_0 e^{-\frac{t\ln 2}{4}}$ $\quad t = .75$

$600 = y_0 e^{-\frac{.75\ln 2}{4}}$

$y_0 = 683.273$ mg

3. $29 = \frac{\ln 2}{k}$

$k = \frac{\ln 2}{29}$

$S = (2.55)e^{-\frac{t\ln 2}{29}}$

$\frac{1}{2.5} = e^{-\frac{t\ln 2}{29}}$

$-\ln(2.5) = -\frac{t\ln 2}{29}$

$t = 38.336$ years

4. $60 - 70 = (40 - 70)e^{k(5)}$

$-10 = -30e^{5k}$

$\frac{10}{30} = e^{5k}$

$-\ln 3 = 5k$

$k = -\frac{\ln 3}{5}$

$65 - 70 = (40-70)e^{-\frac{\ln 3}{5}t}$

$-5 = -30e^{-\frac{\ln 3}{5}t}$

$\frac{1}{6} = e^{-\frac{\ln 3}{5}t}$

$-\ln 6 = -\frac{t\ln 3}{5}$

$t = 8.155$ minutes after it was first brought in

5. $150 - 60 = (180 - 60)e^{-k(20)}$

$\frac{3}{4} = e^{-20k}$

$\ln 3 - \ln 4 = -20k$

$k = \frac{\ln 3 - \ln 4}{-20}$

$T_{60} - 60 = (180 - 60)e^{\left(\frac{\ln 3 - \ln 4}{20}\right)60}$

$T_{60} = 110.625^\circ F$

$100 - 60 = (180 - 60)e^{\frac{-(\ln 3 - \ln 4)}{-20}t}$

$\frac{1}{3} = e^{\left(\frac{\ln 3 - \ln 4}{20}\right)t}$

$-\ln 3 = \left(\frac{\ln 3 - \ln 4}{20}\right)t$

$t = 76.377$ minutes after it started cooling

6. $27.5 = \frac{\ln 2}{k}$

$k = \frac{\ln 2}{27.8}$

$35 = y_0 e^{-\frac{\ln 2}{27.8}(2)}$

$y_0 = 36.790$ units

7. $A = 10000\left(1 + \frac{.0413}{365}\right)^{365(10)} \approx \$15113.10$

$A = 10000e^{(.0413)(10)} \approx \$15113.45$

8. $.58y_0 = y_0 e^{-3k}$

$k = \frac{\ln .58}{-3}$

$H.L. = \frac{\ln 2}{k} = \frac{\ln 2(-3)}{\ln .58}$

≈ 3.8174 days

$.1y_0 = y_0 e^{\frac{\ln .58}{3}t}$

$\ln .1 = \frac{(\ln .58)t}{3}$

$t = 12.681$ days