P412 #54

$\ln(30 \cdot 1.15^x) = \ln 30 + \ln 1.15^x$

$= \boxed{\ln 30 + x \ln 1.15}$ ✓ $\approx 3.401 + 0.140x$

P.412 #84

$C = 14.6 \cdot 2^{-\frac{T}{5715}}$

$\ln C = \ln 14.6 + \frac{-T}{5715} \ln 2$

$\boxed{\frac{-5715(\ln C - \ln 14.6)}{\ln 2} = T}$ ✓ $\approx -8245 \ln C + 22{,}105 = T$

P.412 #90

$P = 2000e^{-0.05T}$

$\ln P = \ln 2000 + \ln e^{-0.05T}$

$\ln P - \ln 2000 = -0.05T \ln e$

$\frac{\ln P - \ln 2000}{-0.05} = T$

If $P = 100$

$\frac{\ln 100 - \ln 2000}{-0.05} \approx \frac{4.605 - 7.601}{-0.05} \approx 59.92$

So, after about 60 weeks the production will fall to 100 bbls/week. ✓

P412 #94

$P = 350e^{0.07T}$ ✓

$\ln P = \ln 350 + 0.07T \ln e$

$\frac{\ln P - \ln 350}{0.07} = T$ ✓

let $P = 2000$

$\frac{\ln 2000 - \ln 350}{0.07} \approx 24.90$

So, in about 25 years the demand will reach 2000 megawatts

P.417 #10

a) simple interest is always calculated using the original amount, but compound interest pays interest on the accumulated interest as well.

b) Applying simple interest the amount owed after T months is $P = 300 + 6T$ because the landowner will just owe $6 per month penalty.

c) Applying compound interest, the amount owed after T months is $P = 300(1+0.02)^T$. This is an exponential equation.

d) Suppose $T = 4$

$300(1+0.02)^{48} \approx 776.12$

In this case the landowner will owe $776.12 after 4 years

P438 #58

R = radioactivity remaining

T = time in years

$0.30 = 14.6 \cdot 2^{\frac{-1}{5715}T} \Rightarrow \frac{-[\ln 0.30 - \ln 14.6]5715}{\ln 2} = T$

$\Rightarrow T \approx 32,032$

So, Humans occupied the site about 32,032 years ago.