Hw8-8

① $P=P_0 e^{kt}$

half life = 1590

$t = 8000$ yr

sample = 200 mg

$1/2 = e^{k(1590)}$

$k = \ln(1/2)/1590$

$P = 200e^{k(8000)}$

then $P = 54.082$

③ $\frac{dT}{dt} = k(T-79)$

$T(0) = 295$

$T(0.7) = 190$

$\int \frac{1}{T-79} dT = \int k\,dt$

$\ln(T-79) = kt + C$

$C = \ln(216)$

$k = \frac{10}{7}\ln(111/216)$

using substitution

then:

$\ln(T-79) = \frac{50}{7}\ln(\frac{111}{216}) +$

$\ln(216)$ # 5 hours

$T = 80.8588$ hrs

④ $P=P_0 e^{rt}$

$P_0 = 900$; $t=2$; $P=1800$

$P = 900e^{r(2)} = 1800$

$r = \ln(2)/2$

$P(t) = 900e^{rt}$

$P(5) = 5091.168825$

$P(t) = 2790$; $t = ?$

$3.1 = e^{kt}$; $t = 3.2645$ hours

② $P=P_0 e^{rt}$

where 0.94 ; half = 5730

$1/2 = e^{k(5730)}$; $k = \ln(1/2)/5730$

full life = $5730 \times 2 = 11460$

$\frac{94}{100} = e^{kt}$; $\ln(\frac{94}{100})/k = (t)$

then the value of $t \approx 511.501$ years ago

⑤ $P=P_0 e^{rt}$; $r = 0.0132$

available land = $13,500,000 \times 640$

max people = 17.28 B

Current people = 6.06 B

$\frac{17.28}{6.06} = e^{rt}$; $\frac{\ln(\frac{17.28}{6.06})}{0.0132} \approx 79$

then we gonna die at 2079