(2) Rate of change of P is proportional to P. When $t=0$, $P=5000$ and when $t=1$, $P=4750$. Find P when $t=5$.

$\frac{dP}{dt} = kP$

$\int \frac{1}{P}\,dP = \int k\,dt$

$\therefore P = Ce^{kt}$

[1] $5000 = Ce^{0}$

$C = 5000$

$P = 5000e^{kt}$

[2] $4750 = 5000e^{k}$

$.95 = e^{k}$

$\ln .95 = k$

$P = 5000e^{\ln .95 t}$

[3] $P = 5000e^{(\ln .95)5}$

$P \approx 3868.905$

AP Questions:

1) Decay rate proportional to amt
Four yrs ago → 12 grams
Now → 8 grams
How many grams 8 yrs from now?

$t=0,\ g=12$
$t=4,\ g=8$
$t=12,\ g=?$

$\frac{dg}{dt} = kg$

$g = Ce^{kt}$

$12 = Ce^{0}$

$C = 12$

$g = 12e^{kt}$

$8 = 12e^{4k}$

$\frac{2}{3} = e^{4k}$

$\ln \frac{2}{3} = 4k$

$k = \frac{\ln \frac{2}{3}}{4}$

$g = 12e^{\left(\frac{\ln \frac{2}{3}}{4}\right)t}$

$g = 12e^{\left(\frac{\ln \frac{2}{3}}{4}\right)12}$

$g = 12e^{3\ln \frac{2}{3}}$

$g = 12e^{\ln \frac{8}{27}}$

$g = 12 \cdot \frac{8}{27}$

$g = \frac{32}{9}$ C