$$\frac{dP}{dt} = kP\left(1 - \frac{P}{4000}\right) \Rightarrow \int \frac{dP}{P\left(1-\frac{P}{4000}\right)} = \int k\,dt.$$

$$\left(\begin{aligned} &\frac{A}{P} + \frac{B}{1-\frac{P}{4000}} = 1 \\ &A\left(1 - \frac{P}{4000}\right) + bP = 1 \\ &A=1 \quad P = \frac{1}{4000} \end{aligned}\right)$$

$$\Rightarrow \int\left(\frac{1}{P} + \frac{\frac{1}{4000}}{1-\frac{P}{4000}}\right)dP = kt + C.$$

$$\Rightarrow \int\left(\frac{1}{P} + \frac{1}{4000-P}\right)dP = kt + C.$$

$$\Rightarrow \ln P - \ln(4000-P) = kt + C.$$

$$\Rightarrow \ln\left(\frac{P}{4000-P}\right) = kt + C$$

$$\Rightarrow e^{kt}\cdot A = \frac{P}{4000-P}.$$

$$\Rightarrow P = e^{kt}\cdot A\,(4000-P)$$

$$P(1+e^{kt}) = A\,4000 \Rightarrow P = \frac{4000}{A_0e^{-kt}+1}$$

$(t=0,\ P=40)$

$$40 = \frac{4000}{A_0e^{-k(0)}+1} \qquad A_0 = \frac{4000}{40} - 1$$

$$A_0 = 99.$$

$$P = \frac{4000}{99A^{-kt}+1}$$

$(t=5\ \ P=104)$

$$104 = \frac{4000}{99A^{-k(5)}+1}$$

$$104(99A^{-5k}+1) = 4000$$

$$99^{-5k}+1 = \frac{4000}{104}$$

$$(-5k)\ln 99 = \ln\left(\frac{4000}{104} - 1\right)$$

$$k \approx -.194.$$

$t = 15$

$$P = \frac{4000}{99B^{-(1.194)(\ldots)}+\ldots}$$

$P \approx 626$