6.2 (p420) 14, 22

$$\frac{dP}{dt} = k(25-t)$$

$$\int \frac{dP}{dt}\,dt = \int k(25-t)\,dt$$

$u = 25-t$
$du = -dx$
$-du = dx$

$$P = -k\int u\,du$$

$$P = -k\,\frac{u^2}{2} + C$$

$$P = -\frac{k}{2}(25-t)^2 + C$$

6.2 (p420) 22

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

(Recall the solution is $P = Ce^{kt}$)

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

$$\ln P = kt + C_1$$

$$P = Ce^{kt} + C$$

at $(0, 5000)$

$5000 = Ce^{k(0)}$, $C = 5000$

at $(1, 4750)$

$4750 = 5000e^{k}$

$\frac{19}{20} = e^{k}$

$k = \ln\left(\frac{19}{20}\right)$

$P(5) = 5000e^{t(\ln 19/20)}$

$P(5) = 5000e^{5(\ln 19/20)}$

$P(5) = 5000\left(\frac{19}{20}\right)^5 \approx 3868.905$