6) $F(t) = F_A + (F_0 - F_A)e^{-kt}$

$F_A = 40$ $\quad 300 \rightarrow 200$ in 1 min.

$F(t) = 40 + 260e^{-kt}$

$200 = 40 + 260e^{-k}$

$160 = 260e^{-k}$

$\frac{16}{26} = e^{-k}$

$\ln\frac{16}{26} = -k$

$k = -\ln\frac{16}{26}$

$k = 0,485$

$110 = 40 + 260e^{-0,485t}$

$\frac{11}{26} = e^{-0,485t}$

$t = \frac{\ln\left(\frac{11}{26}\right)}{-0,485} = 1,77$ mins

(5) $T_A = 60$

$100 = 60 + (T_0 - 60)\, e^{-k\left(\frac{1}{3}\right)}$

$80 = 60 + (T_0 - 60)\, e^{-k}$ — PLUG IN

$\downarrow$

$\frac{20}{T_0 - 60} = e^{-k} \rightarrow \left(\frac{20}{T_0 - 60}\right)^{1/3} = e^{-k/3}$

$40 = (T_0 - 60)\left(\frac{20}{T_0 - 60}\right)^{1/3}$

$40 = 20^{1/3} \cdot (T_0 - 60)^{2/3}$

$\frac{40}{20^{1/3}} = (T_0 - 60)^{2/3}$

$\left(\frac{40}{20^{1/3}}\right)^{3/2} = T_0 - 60$

$T_0 = 60 + \frac{40^{3/2}}{20^{1/2}} = 116.6°$

$80 = 60 + (116.6 - 60)\, e^{-k}$

$\frac{20}{56.6} = e^{-k}$

$$k = -\ln\left(\frac{20}{56.6}\right) = 1.040$$

$$v = -\frac{gm}{k} + \frac{gm}{k} e^{-kt/m}$$

$$v = -98 + 98 e^{-0.1t}$$

$$-49 = -98 + 98 e^{-0.1t}$$

$$\frac{1}{2} = e^{-0.1t}$$

$$\ln \frac{1}{2} = -0.1t$$

$$t = \frac{\ln 1/2}{-0.1} = 6.93 \text{ s}$$

$$v = -98 + 98 e^{-0.1t}$$

$$v(\infty) = -84.737 \text{ m/s}$$

$$k = 55: \quad -\frac{9.8(80)}{55} = -14.254 \text{ m/s}$$

$$v(t) = -14.254 + c e^{-0.6875t}$$

$$v(0) = -14.254 + c = -84.737$$

$$c = -70.483$$

$$v(t) = -14.254 - 70.483 e^{-0.6875t}$$

$$v(5) = -14.254 - 70.483 e^{-0.6875(5)}$$

$= -16.5 \text{ m/s}$