3.3 pg 107

#4 $T_0 = 10^\circ C$, $M = 23^\circ C$

Given $T(10) = 15^\circ C$, $t = ?$ for $T = 18^\circ C$

NLC $T = T(t) = M + (T_0 - M)e^{kt}$

The given info is needed to determine k, the heat transfer coefficient.

$$15 = 23 + (10-23)e^{10k}$$

$$\frac{-8}{-13} = e^{10k} \Rightarrow k = \frac{\ln\left(\frac{8}{13}\right)}{10}$$

$$k \approx -0.048550781 \text{ sto } K$$

How long then till the wine warms to $18^\circ C$

$$18 = 23 + (10-23)e^{kt}$$

$$-5 = -13e^{kt}$$

$$\frac{5}{13} = e^{kt} \Rightarrow t = \frac{\ln\left(\frac{5}{13}\right)}{k}$$

$$t \approx 19.680660411 \text{ min.}$$