PDE Solve Block

$$\frac{\partial}{\partial t}T(x,t) = \frac{\lambda}{\rho \cdot c_p}\cdot\frac{d^2}{dx^2}T(x,t)$$

Data

Thermal cond.:	$\lambda := 3.4$	[W/mK]:	
Density	$\rho := 2950$	[kg/m^3]	
Thermal cap.:	$c_p := 1050$	J/kgK]	
Thikness:	$L := 0.22$	[m]	
Convection:	$h := 9$	[W/m^{2}K]	
Ambient temperature:	$T_{inf} := 298$	[^{o}C]	
T(0,t) - temperature	$T_{rob} := 1573$	[^{o}C]	
No of elements:	$n_x := 25$		
Step time:	$nTime := 1000$		
Total calculation time (80 h):	$t_{max} := 288000$	[s]	$t_{maxh} := \frac{t_{max}}{3600}$ t_{maxh}
Emissivity	$em := 0.85$		
SB constant	$sb := 5.6697\cdot 10^{-8}$		

Given

$$T_t(x,t) = \frac{\lambda}{\rho \cdot c_p}\cdot T_{xx}(x,t)$$

IC and BC

$$T(x,0) = T_{inf}$$

$$T(0,t) = T_{rob}$$

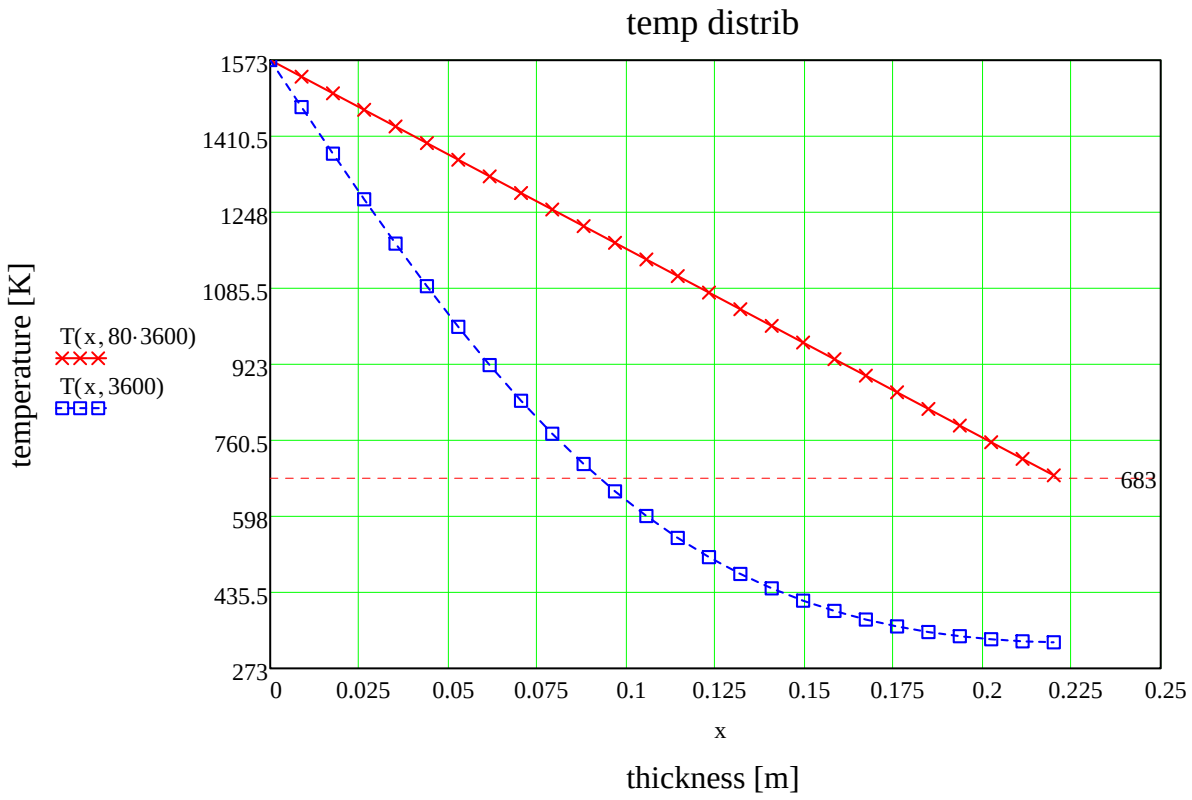
$$-\lambda \cdot T_x(L,t) = h\cdot\left(T(L,t) - T_{inf}\right) + em\cdot sb\cdot\left(T(L,t)^4 - T_{inf}^4\right)$$

PDSOLVE - solution

$$T := Pdesolve\left[T, x, \begin{pmatrix}0\\ L\end{pmatrix}, t, \begin{pmatrix}0\\ t_{max}\end{pmatrix}, n_x, nTime\right]$$

$$t := 0, \frac{t_{max}}{nTime} .. t_{max}$$

$$x := 0, \frac{L}{n_x} .. L$$



$$685 - 273 = 412$$

= 80 [h]