Exercise # 1

A thin plate is initially at a uniform temperature of 200 °C at t = 0. Also, for all times T_a = 100 °C and T_b = 30 °C at the right end of the plate. Neglect energy generation in the plate. The other sides in the y and z axes are perfectly insulated. The data are:

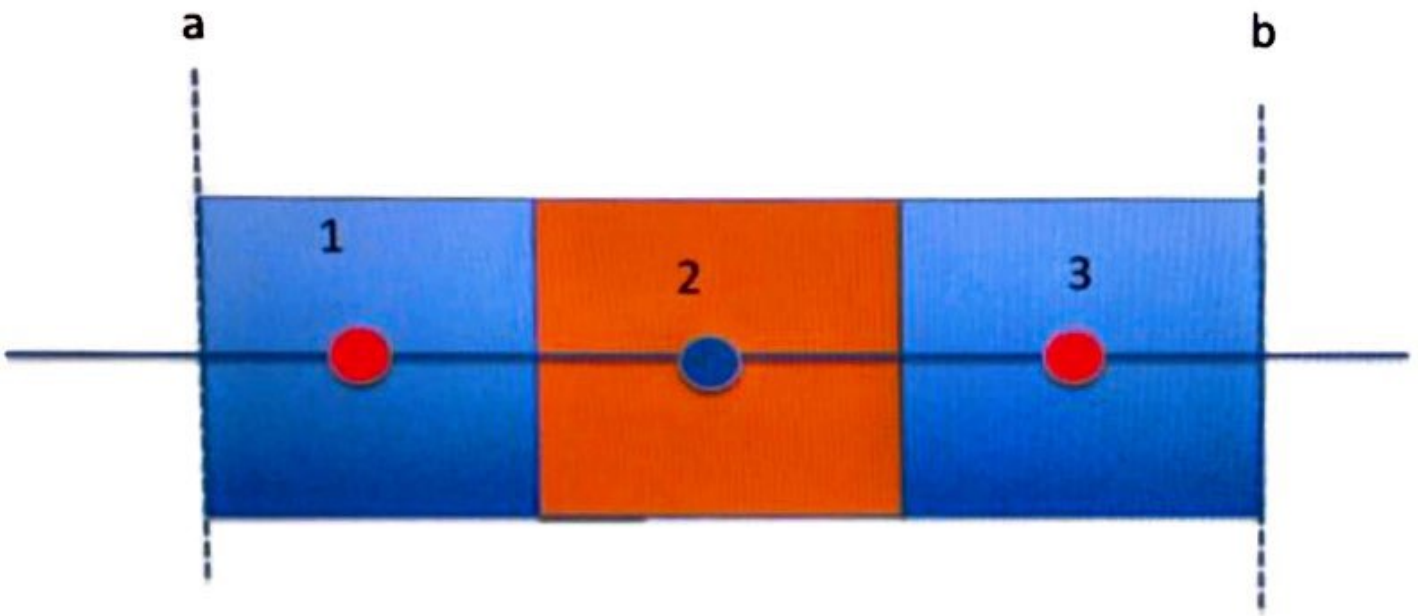
- L= 0.012 m, k= 10 W/m*K, h= 50 W/m^2*K and ρC =10X10^6 J/m^3*K
- T_∞ = 20 °C

- Only face "b" (see Figure) is exposed to both radiation & convection
- Determine the following :
  - Known the values
  - Provide appropriate assumptions to analyze this problem
  - T_p equations of CV1, CV2 and CV3 for a 1D problem, where CV is control volume
  - Transient temperature distribution (T_1, T_2 & T_3) of the slab at t = 20, 25 and 30 sec via the explicit finite volume method in conjunction with a suitable time step size to calculate

Hints:

$$T_1^0 = T_2^0 = T_3^0 \qquad \Delta t < \frac{\rho C \Delta x^{(2)}}{2k}$$

Problem # 2 (Figure)



$T_{sur}=T_{\infty}$ = 20 °C, h= 50 W/m²*K, ε=1

Exercise # 2

Repeat Problem # 2 but consider a uniform energy generation (S_bar) = 5 W/m^3 on the thin plate

Hint: $T_1^0 - T_2^0 - T_3^0$