

### Home Work Problem 4

An infinite parallel-sided slab of length ( $0 \leq x \leq L$ ) of thermal diffusivity  $\alpha$  is initially ( $t = 0$ ) at uniform temperature  $T_0$ . Its two ends are subsequently maintained at a constant temperature  $T_1$ . Use the explicit method to determine the temperature variation with time and position. First, rewrite the unsteady, one-dimensional governing equation in the non-dimensional form using the following non-dimensionalization scheme.

$$\theta = \frac{T - T_0}{T_1 - T_0}, \quad \tau = \frac{\alpha t}{L^2}, \quad \xi = \frac{x}{L}$$

Plot the temperature ( $\theta$ ) distributions at  $\tau = 0.35, 0.25, 0.1$  and  $0.05$ .

Discuss the choice of time steps with regard to stability and accuracy.

Include a copy of your computer program and representative printed results.