

**Exercise 1.4.1**

Determine the equilibrium temperature distribution for a one-dimensional rod with constant thermal properties with the following sources and boundary conditions:

- (a)  $Q = 0, \quad u(0) = 0, \quad u(L) = T$
- (b)  $Q = 0, \quad u(0) = T, \quad u(L) = 0$
- (c)  $Q = 0, \quad \frac{\partial u}{\partial x}(0) = 0, \quad u(L) = T$
- (d)  $Q = 0, \quad u(0) = T, \quad \frac{\partial u}{\partial x}(L) = \alpha$
- (e)  $\frac{Q}{K_0} = 1, \quad u(0) = T_1, \quad u(L) = T_2$
- (f)  $\frac{Q}{K_0} = x^2, \quad u(0) = T, \quad \frac{\partial u}{\partial x}(L) = 0$
- (g)  $Q = 0, \quad u(0) = T, \quad \frac{\partial u}{\partial x}(L) + u(L) = 0$
- (h)  $Q = 0, \quad \frac{\partial u}{\partial x}(0) - [u(0) - T] = 0, \quad \frac{\partial u}{\partial x}(L) = \alpha$