

**Exercise 2.4.1**

Solve the heat equation  $\partial u / \partial t = k \partial^2 u / \partial x^2$ ,  $0 < x < L$ ,  $t > 0$ , subject to

$$\frac{\partial u}{\partial x}(0, t) = 0 \quad t > 0$$

$$\frac{\partial u}{\partial x}(L, t) = 0 \quad t > 0.$$

$$\begin{array}{ll} \text{(a)} & u(x, 0) = \begin{cases} 0 & x < L/2 \\ 1 & x > L/2 \end{cases} \\ \text{(b)} & u(x, 0) = 6 + 4 \cos \frac{3\pi x}{L} \\ \text{(c)} & u(x, 0) = -2 \sin \frac{\pi x}{L} \\ \text{(d)} & u(x, 0) = -3 \cos \frac{8\pi x}{L} \end{array}$$