Exercise 2

Consider the equation $u_{tt} = c^2 u_{xx}$ for $0 < x < l$, with the boundary conditions $u_x(0,t) = 0$, $u(l,t) = 0$ (Neumann at the left, Dirichlet at the right).

(a) Show that the eigenfunctions are $\cos[(n + \frac{1}{2})\pi x/l]$.

(b) Write the series expansion for a solution $u(x,t)$.