

Exercise 15

Prove the uniqueness of the diffusion problem with Neumann boundary conditions:

$$u_t - ku_{xx} = f(x, t) \quad \text{for } 0 < x < l, t > 0 \quad u(x, 0) = \phi(x)$$

$$u_x(0, t) = g(t) \quad u_x(l, t) = h(t)$$

by the energy method.