

Solve the heat equation

$$\frac{1}{k} \frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \quad \text{for } 0 < x < \infty, \quad 0 < t < \infty,$$

$$u(0, t) = 0, \quad u(x, 0) = f(x).$$

Rearrange the solution into a Green-function form.