

Exercise 40

Solve the diffusion equation

$$\begin{aligned}u_t &= \kappa u_{xx}, & -a < x < a, & t > 0, \\u(x, 0) &= 1 & \text{for } -a < x < a, \\u(-a, t) &= 0 = u(a, t) & \text{for } t > 0.\end{aligned}$$