

Homework C

Solve each of the following problems in the most appropriate manner:

1.

$$\begin{aligned}u_{tt} - c^2 u_{xx} &= H(x, t), \quad 0 < x < L, \\u_x(0, t) &= 0, \quad u(L, t) = 0, \\u(x, 0) &= f(x), \quad u_t(x, 0) = g(x), \quad 0 < x < L.\end{aligned}$$

2.

$$\begin{aligned}u_{tt} - c^2 u_{xx} &= H(x, t), \quad 0 < x < L, \\u_x(0, t) &= \alpha(t), \quad u(L, t) = \beta(t), \\u(x, 0) &= f(x), \quad u_t(x, 0) = g(x), \quad 0 < x < L.\end{aligned}$$

3. The following heat equation in the ball of radius R :

$$\begin{aligned}u_t &= \rho^{-2} (\rho^2 u_\rho)_\rho + H(\rho), \quad 0 < \rho < R, \quad t > 0, \\u(\rho, 0) &= \phi(\rho), \quad 0 < \rho < R, \\u(R, t) &= A = \text{constant}.\end{aligned}$$