

MATH2100 Assignment 9, MATH2011 Assignment 4

1. Find the temperature $u(x, t)$ in a bar of silver (length 10cm, constant cross section of area 1 cm^2 , density 10.6 gm/cm^3 , thermal conductivity $1.04 \text{ cal/cm sec } ^\circ\text{C}$, specific heat $0.056 \text{ cal/gm } ^\circ\text{C}$) that is perfectly insulated laterally and whose ends are kept at temperature $0 \text{ } ^\circ\text{C}$, whose initial temperature distribution is $f(x) = 5 - |x - 5| \text{ } ^\circ\text{C}$.
2. Find the temperature in a bar insulated at both ends with

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

where

$$f(x) = \begin{cases} 1 & \text{if } 0 < x < \frac{\pi}{2}, \\ 0 & \text{if } \frac{\pi}{2} < x < \pi. \end{cases}$$

3. Find the temperature $u(x, t)$ in a bar of length L that is kept at zero temperature at $x = 0$, assuming that the end $x = L$ is perfectly insulated, the initial temperature is a constant U_0 and $u_x(L, t) = 0$ (because of perfect insulation there).