

Suggested problems 35

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1. Solve the heat conduction problem described by:

$$\begin{aligned}u_t &= 9u_{xx}, & 0 < x < 5, t > 0 \\u(0, t) &= 0, & u(5, t) &= 0 \\u(x, 0) &= \sin \frac{2\pi x}{5} - 3 \sin(\pi x) + 13 \sin \frac{7\pi x}{5}\end{aligned}$$

2. Suppose the temperature distribution function $u(x, t)$ of a rod that has both ends perfectly insulated is given by the initial-boundary value problem

$$\begin{aligned}9u_{xx} &= u_t, & 0 < x < 4, t > 0 \\u_x(0, t) &= 0, & u_x(4, t) &= 0 \\u(x, 0) &= 2 - \cos(\pi x) - 7 \cos(5\pi x).\end{aligned}$$

- (a) Find the particular solution of the above initial-boundary value problem.
(b) What is $\lim_{t \rightarrow \infty} u(3, t)$?