

HW #9b

Math 182, Spring 2009

Due Friday, April 3, 2009, by 11:00 a.m.

1. Solve the heat equation,

$$\begin{cases} u_t - ku_{xx} = 0, & -\infty < x < \infty, t > 0 \\ u_x(0, t) = u_x(L, t) = 0 \end{cases}$$

with initial conditions

$$(a) \quad u(x, 0) = \begin{cases} 0, & 0 < x < \frac{L}{2} \\ 1, & \frac{L}{2} < x < L \end{cases}$$

$$(b) \quad u(x, 0) = 6 + 4 \cos\left(\frac{3\pi}{L}x\right)$$

$$(c) \quad u(x, 0) = -3 \cos\left(\frac{8\pi}{L}x\right)$$

2. Solve the eigenvalue problem

$$\begin{aligned} \frac{d^2\phi}{dx^2} + \lambda\phi &= 0 \\ \phi(0) &= \phi(2\pi) \\ \frac{d\phi}{dx}(0) &= \frac{d\phi}{dx}(2\pi) \end{aligned}$$

3. p. 125: 5.6(a)