NDU MAT 335 (PDEs) Exam # 1 Spring 2002

Duration: 55 min

1) Solve the 1-d heat flow problem

PDE: $u_t = \alpha^2 u_{xx}$ $\quad 0 < x < 1, \quad 0 < t < \infty$

BC: $u(0,t) = 0$ $\quad 0 < t < \infty$

BE: $u(1,t) = 0$ $\quad 0 < t < \infty$

IC: $u(x,0) = \phi(x)$ $\quad 0 < x \leq 1$

2) Solve the IBVP

PDE: $u_t = u_{xx}$ $\quad 0 < x < 1, \quad 0 < t < \infty$

BC: $u(0,t) = 0$ $\quad 0 < t < \infty$

BC: $u(1,t) = \cos t$ $\quad 0 < t < \infty$

IC: $u(x,0) = x$ $\quad 0 < x < 1$

By (a) transforming it to one with homogeneous BCs
(b) solving the resulting problem by expanding it in terms of eigenfunctions

$$0 = \frac{2}{L}(\cos t - 0)$$

Good Luck!

$$\frac{n\cos t}{L}$$