

Math. 4581, Practice Test 2

1. Solve the following boundary value problem:

$$\begin{cases} \nabla^2 u(x, y) = x \cos \pi y & \text{for } 0 < x, y < 1, \\ u(0, y) = u(1, y) = 0 & \text{for } 0 < y < 1, \\ u_y(x, 0) = \sin \pi x, u_y(x, 1) = 0 & \text{for } 0 < x < 1. \end{cases}$$

2. Solve the boundary value problem

$$\begin{cases} u_t = 9u_{xx} & \text{for } 0 < x < 1, t > 0, \\ u(t, 0) = u(t, 1) = 0 & \text{for } t > 0, \\ u(0, x) = \begin{cases} x & 0 < x < \frac{1}{2} \\ 1 - x & \frac{1}{2} < x < 1. \end{cases} \end{cases}$$