Dr. Z.'s Calc5 Homework assignment 17

1. Solve :

$$u_{xx} + u_{yy} = 0 \quad , \quad 0 < x < \pi \quad , \quad 0 < y < 1 \quad ,$$

Subject to

$$u(0, y) = 0 \quad , \quad u(\pi, y) = 0 \quad , \quad 0 < y < 1 \quad ;$$

$$u(x, 0) = 0 \quad , \quad u(x, 1) = f(x) \quad , \quad 0 < x < \pi \quad .$$

2. Solve :

$$u_{xx} + u_{yy} = 0 \quad , \quad 0 < x < \pi \quad , \quad 0 < y < 1 \quad ,$$

Subject to

$$u(0, y) = 0 \quad , \quad u(\pi, y) = 0 \quad , \quad 0 < y < 1 \quad ;$$

$$u_y(x, 0) = 0 \quad , \quad u(x, 1) = f(x) \quad , \quad 0 < x < \pi \quad .$$

3. Solve :

$$u_{xx} + u_{yy} = 0 \quad , \quad 0 < x < \pi \quad , \quad 0 < y < 1 \quad ,$$

Subject to

$$u_x(0, y) = 0 \quad , \quad u_x(\pi, y) = 0 \quad , \quad 0 < y < 1 \quad ;$$

$$u_y(x, 0) = 0 \quad , \quad u(x, 1) = f(x) \quad , \quad 0 < x < \pi \quad .$$

4. Explain how you would solve the following boundary-value pde problem

$$u_{xx} + u_{yy} = 0 \quad , \quad 0 < x < 3 \quad , \quad 0 < y < 4$$

$$u(0, y) = y^3 \quad , \quad u(3, y) = \cos 7y \quad , \quad 0 < y < 4 \quad .$$

$$u(x, 0) = x^3 \quad , \quad u(x, 4) = e^x \quad , \quad 0 < x < 3 \quad .$$

By breaking it up into two simpler problems. **Do not solve these problems**.