

PHYS 380

QUESTIONS FOR THE WEEK OF 31 AUGUST

1. Consider the partial differential equation :

$$2 \frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial y^2} = 0$$

on the square extending from $(0, 0)$ to (π, π) . Find the solution to this equation for the boundary conditions :

a) all BCs = 0 except $f(x, \pi) = 4 \sin(5x)$

b) all BCs = 0 except $f(\pi, y) = 3 \sin(7y)$

2. Suppose now you are asked to solve this equation on this square but the BCs are now $f(x, 0) = f(0, y) = 0$; $f(x, \pi) = 4 \sin(5x)$ and $f(\pi, y) = 3 \sin(7y)$ What is the solution with this set of BCs?

3. Boas, problems 5 and 6 from page 650.

4. Write the heat diffusion equation in spherical polar coordinates. What is your trial solution. What ODEs do you obtain when separating variables? Let's look at those ODEs and think about what their solutions might be.