

### Math 553 Homework # 3

*Due Wednesday Oct. 18 in class.*

**Section 3.1** # 1,5,6

**Section 3.3** # 4,5 (b),(c)

**Section 5.1** # 2,6,7

Show that the Laplace equation

$$\frac{\partial^2 U}{\partial r^2} + \frac{1}{r} \frac{\partial U}{\partial r} + \frac{1}{r^2} \frac{\partial^2 U}{\partial \theta^2} = 0 \quad U(1, \theta) = f(\theta) \quad U_r(1, \theta) = g(\theta)$$

is not well-posed in the Hadamard sense. In particular show that solutions do not depend continuously on the initial data  $f, g$ .