Partial Differential Equations
MATH 612
A. Bonito

Due April 23
Spring 2013

Assignement 4

Exercise 1 **50%**

Prove that there is at most one smooth solution of

$$\frac{\partial}{\partial t}u - \Delta u = f, \qquad \text{in} \qquad U_T$$

supplemented by the boundary conditions

$$\frac{\partial}{\partial \nu}u = 0, \quad \text{on} \quad \partial U \times [0,T], \qquad u = g, \quad \text{on} \quad U \times \{t=0\}.$$

Exercise 2 **50%**

Prove that there is at most one smooth solution of the *telegraph* equation

$$\frac{\partial^2}{\partial t^2}u + d\frac{\partial}{\partial t}u - \Delta u = f, \qquad \text{in} \qquad (0,1)\times(0,T)$$

supplemented by the boundary conditions

$$u = 0, \quad \text{on} \quad \{0\}\times[0,T] \cup \{1\}\times[0,T], \qquad u = g,\ u_t = h \quad \text{on} \quad (0,1)\times\{t=0\}.$$

Here d is a constant.