## Homework 2

Problem 1.

Consider the Reaction-Diffusion equation

$$u_t = u_{xx} + \lambda u$$

for  $x \in (0,1)$  with the initial condition  $u_0(x) = u(x,0)$  and boundary conditions

$$u_x(0) = 0$$
  
 $u(1) = 0.$ 

1) Find the solution of this PDE.

2) For what values of the parameter  $\lambda$  is this system unstable?

Problem 2.

Consider the heat equation

$$u_t = u_{xx}$$

with Robin's boundary conditions

$$u_x(0) = -qu(0)$$
  
 $u(1) = 0.$ 

Find the range of values of the parameter q for which this system is unstable.