MATHEMATICS 322
ASSIGNMENT 5
Due: October 7, 2015

01• Let $I = [\,0,1\,]$ and let $J = [\,0,\infty)$. Let f be a complex valued function defined on I and let γ be a complex valued function defined on $J \times I$ which meets the conditions:

$$(H) \qquad \begin{aligned} \gamma_t(t,x) &= \gamma_{xx}(t,x) \\ \gamma(0,x) &= f(x) \end{aligned}$$

where $0 \leq t$ and $0 \leq x \leq 1$. The foregoing assembly (H) is a simple form of the Heat Equation. One may interpret $\gamma(t,x)$ as the *temperature* at time t at the position x in the *rod* I. Given f, find various solutions γ by the method of Separation of Variables:

$$\gamma(t,x) = \alpha(t)\beta(x)$$

Of course, you may form linear combinations of the solutions you find. In particular, find solutions subject to the following boundary conditions:

(1) $\gamma(t,0) = 0$ and $\gamma(t,1) = 0$

Do the same for the cases:

(2) $\gamma_x(t,0) = 0$ and $\gamma(t,1) = 0$

(3) $\gamma(t,0) = 0$ and $\gamma_x(t,1) = 0$

and, finally, for the case:

(4) $\gamma_x(t,0) = 0$ and $\gamma_x(t,1) = 0$