MATH 513 Term 032

Assignment # 1

1) Apply separation of variables method and if it works obtain the solution of the two ordinary differential equations.

a) $u_{xx} - u_t - u_{tt} = 0$

b) $xu_{xx} + u_{xt} + tu_{tt} = 0$

c) $u_{xt} + xtu_{tt} = 0$

2) Solve the Boundary value Problem

$u_t = ku_{xx}$ in $0 < x < 1,\ t > 0$

$u(0,t) = u(1,t) = 0,\ t > 0$

$u(x,0) = p$(p constant).

3) Solve the above PDE for $-l < x < l$

$u(-l,t) = u(l,t)$ and $u_x(-l,t) = u_x(l,t)$.

Check all cases of separation constant and obtain the series solution.

Determine the constants in the series bu using

$$u(x,0) = \begin{cases} 0, l > x > 0 \\ 1, -l < x < 0 \end{cases}$$