1. (a) Find the general solution of the equation

\[
xz \frac{\partial z}{\partial x} + yz \frac{\partial z}{\partial y} = -xy.
\]  

(1)

(b) Determine the solution of (1) passing through the curve \( y = x^2, z = x^3 \).

2. Solve the Neumann problem

\[
\Delta u = 0, x^2 + y^2 < 16 \\
\frac{\partial u}{\partial n} = y, x^2 + y^2 = 16.
\]  

(2)

3. Solve the following transport equation \( u_x + yu_y + \frac{1}{z}u = 0 \) if \( u(1, y) = e^y \).

4. Decompose the following boundary value problem,

\[
u_{tt} = c^2 u_{xx} + f(t, x), \\
u(0, x) = g(x), u_t(0, x) = n(x), \\
u(t, 0) = m_1(t), u(t, 5) = m_2(t),
\]  

(3)

into three systems more suitable for solution.