M-423/425

First Mid Term 2nd Test, Semester-I, 2013

Dept of Mathematics, Women's Section, King Saud University.

Q1.a Determine an integral surface of

$x(y-z)p + y(z-x)q = z(x-y)$

Which passes through, $x = y = z = t$

Q1.b Define Cauchy's Problem for linear second order partial differential equation in two independent variables and find the solution of Cauchy's Problem.

$U_{xx} - 10U_{xt} + 9U_{tt} = 0, \quad U(x,0) = x^2, \quad U_t(x,0) = 1$

Q2.a Find the general solution of the following differential equation.

i) $(D_x^2 + 3D_xD_y + 2D_y^2)z = x + y$

ii) $2s + 3t - q = 6\cos(2x - 3y) - 3\sin(2x - 3y)$

iii) $\dfrac{\partial^2 z}{\partial x^2} - \dfrac{\partial^2 z}{\partial x \partial y} - 2\dfrac{\partial^2 z}{\partial y^2} + 2\dfrac{\partial z}{\partial y} + 2\dfrac{\partial z}{\partial x} = e^{2x+3y}$

iv) $yz_{xy} + z_x = \cos(x + y) - y\sin(x + y)$ (Use simple integration)

Q3.a Reduce the given equation to Canonical form and obtain the general solution.

$r - (2\sin x)s - (\cos^2 x)t - (\cos x)q = 0$

Q3.b Construct exponential type solution of the given inhomogeneous equation

$(D_x^2 - D_y - 1)z = e^{2x+y}$