Math 3326
Fall Semester 2008
Problem Set #7

1. In each of the following problems, find the canonical form of the following elliptic PDEs:

   (a) $u_{xx} + 2u_{xy} + 5u_{yy} + u_y = 0$

   (b) $3u_{xx} - 2u_{xy} + 2u_{yy} = 0$

   (c) $4u_{xx} + u_{xy} + u_{yy} + u_x - xu_y + yu = 0$

   (d) $2u_{xx} - 2u_{xy} + u_{yy} + \cos(y)u_x = 0.$

2. Let u satisfy the elliptic equation $u_{xx}+u_{yy} = 0$. Show that u_x, u_y, u_{xx}, u_{xy}, and u_{yy} are also solutions. Verify this conclusion by direct calculation for the solution

$$u(x, y) = \sin(x)\cosh(y).$$