

Exercise 2

Determine the nature of the following equations and reduce them to canonical form:

(a) $x^2 u_{xx} + 4xy u_{xy} + y^2 u_{yy} = 0$

(b) $u_{xx} - x u_{yy} = 0$

(c) $u_{xx} - 2u_{xy} + 3u_{yy} + 24u_y + 5u = 0$

(d) $u_{xx} + \operatorname{sech}^4 x u_{yy} = 0$

(e) $u_{xx} + 6y u_{xy} + 9y^2 u_{yy} + 4u = 0$

(f) $u_{xx} - \operatorname{sech}^4 x u_{yy} = 0$

(g) $u_{xx} + 2 \operatorname{cosec} y u_{xy} + \operatorname{cosec}^2 y u_{yy} = 0$

(h) $u_{xx} - 5u_{xy} + 5u_{yy} = 0$