

**32**    CHAPTER 1    WHERE PDEs COME FROM

to the form  $v_{xx} + v_{yy} + cv = 0$  by a change of dependent variable  $u = ve^{\alpha x + \beta y}$  and then a change of scale  $y' = \gamma y$ .

6. Consider the equation  $3u_y + u_{xy} = 0$ .
  - (a) What is its type?
  - (b) Find the general solution. (*Hint*: Substitute  $v = u_y$ .)
  - (c) With the auxiliary conditions  $u(x, 0) = e^{-3x}$  and  $u_y(x, 0) = 0$ , does a solution exist? Is it unique?