2.19 (e)

1   2.19 (e), §1 Asked

Classify:

$$yu_{xx} - 2u_{xy} + e^x u_{yy} + u = 3$$

2   2.19 (e), §2 Solution

$$yu_{xx} - 2u_{xy} + e^x u_{yy} + u = 3$$

$$a = y, b = -1, c = e^x \quad \implies \quad b^2 - ac = 1 - ye^x$$

Parabolic for

$$1 - ye^x = 0 \quad \implies \quad y = e^{-x},$$

elliptic if y is greater than this, hyperbolic if y is less.