• **Problem 1**
  Reduce each of the following equations to standard form (classify each one first) and find the general solution.
  a) \(4u_{xx} + 4u_{xy} + u_{yy} = \sin(x + 2y)\)
  b) \(u_{xx} + 2u_{xy} - 3u_{yy} = e^{x+2y}\)

• **Problem 2**
  Problem 4, section 2.2 McOwen book, page 59.

• **Problem 3**
  Problem 5, section 2.2 McOwen book, page 59.

• **Problem 4**
  Write \(u_{tt} = c^2u_{xx}, u(x, 0) = f(x), u_t(x, 0) = g(x)\) as an initial-value problem for the vector \((u_1, u_2) = (u_t, u_x)\).
  a) Reduce the system to canonical form and solve it.
  b) Solve the mixed problem
  \(u_{tt} = c^2u_{xx}\) for \(x > 0, t > 0\)
  \(u(x, 0) = f(x), u_t(x, 0) = g(x)\) for \(x > 0\)
  \(u_t(0, t) + au_x(0, t) = h(t)\) for \(t > 0\),
  where \(a = \text{const.}\)

• **Problem 5**
  Problem 8, section 2.3 McOwen book, page 71.

• **Problem 6**
  Problem 10, section 2.3 McOwen book, page 71.