Problem 1

Find the solution of the equation

$$2u_x + 5u_y = 0$$

which satisfies the condition $u(x, 1) = 10x + 1$.

Problem 2

Solve the equation

$$3u_x + 2u_y = 4y.$$

Hint: First you need to find one solution.

Problem 3

Solve the equation

$$yu_x + 2xu_y = 0.$$

Problem 4

Solve the equation

$$x \sin(y) u_x = u_y.$$

Problem 5

Guess a solution of the heat equation

$$u_t = u_{xx}$$

with the initial condition $u(x, 0) = 1$ and insulated boundary conditions

$$u_x(0, t) = u_x(1, t) = 0, \quad t > 0.$$

Due date: September 27, 2012