



PARTIAL DIFFERENTIAL EQUATIONS
SPRING 2017

ASSIGNMENT 2
DUE JANUARY 24

(a) Find the general solution to the given partial differential equation and (b) use it to find the solution satisfying the given initial data.

Exercise 1. $2\frac{\partial u}{\partial x} - \frac{\partial u}{\partial y} = (x + y)u$

$$u(x, x) = e^{-x^2}$$

Exercise 2. $\frac{\partial u}{\partial x} = -(2x + y)\frac{\partial u}{\partial y}$

$$u(0, y) = 1 + y^2$$

Exercise 3. $y\frac{\partial u}{\partial x} + x\frac{\partial u}{\partial y} = 0$

$$u(x, 0) = x^4$$

Exercise 4. $\frac{\partial u}{\partial x} + 2y\frac{\partial u}{\partial y} = e^{-x} - u$

$$u(0, y) = \arctan y$$

Exercise 5. $\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} = -ru$ (here r and $v \neq 0$ are constants)

$$u(x, 0) = \frac{\sin x}{x}$$