Worksheet 22

Sections 207 and 219

MATH 54

April 23, 2019

Exercise 1. Use the method of separation of variables to write the following partial differential equation as a system of 2 ordinary differential equations (using some parameter λ):

$$\frac{\partial u}{\partial t} = \beta \frac{\partial^2 u}{\partial x^2}$$

where u is a function of x and t.

Exercise 2. Determine all solutions, if any, to the following boundary value problem:

$$y'' + 9y = 0, \ 0 < x < \pi$$

$$y(0) = 0, \ y'(\pi) = -6$$

Exercise 3. Find all values of λ for which the given problem has a nontrivial solution. Then find the nontrivial solution.

$$y'' - 2y' + \lambda y = 0, \ 0 < x < \pi$$
$$y(0) = 0, \ y(\pi) = 0$$