

# MST 352/652

## Homework #9

Due Date: April 09, 2019

### 1 Problems for everyone

1. pg. 170-172, #4.3.25, #4.3.26, #4.3.28, #4.3.31, #4.3.34, #4.3.36.
2. Consider the following boundary value problem on a quarter wedge of radius  $R$ :

$$\begin{aligned}\Delta u &= 0, r < R, 0 \leq \theta \leq \pi/2, \\ u(R, \theta) &= \sin(2\theta), \\ u(r, 0) = u(r, \pi/2) &= 0.\end{aligned}$$

- (a) Solve this boundary value problem.
  - (b) Sketch a contour plot of your solution. (If you want to, you can use software to do this.)
3. Consider the following boundary value problem on an annulus:

$$\begin{aligned}\Delta u &= 0, 1 < r < 2, 0 \leq \theta \leq 2\pi, \\ u(1, \theta) &= 0, \\ u(2, \theta) &= \sin^2(\theta).\end{aligned}$$

- (a) What additional boundary conditions must be imposed to make this problem well posed?
  - (b) Solve this boundary value problem.
  - (c) Sketch a contour plot of your solution. (If you want to, you can use software to do this.)
4. pg. 227-228, #6.1.1, #6.1.2, #6.1.4-6.1.6, #6.1.23.

### 2 Graduate Problems

1. #6.1.7-6.1.10, #6.1.24.