HOMEWORK 10

Due: 11/18/2016

1. Textbook Exercises

10.7: 9

10.8: 8, 10

2. Additional Exercises

A1. Solve question **79** from Prof. Nolen's *Additional Homework Problems*.

A2. Find the solution $u(x,t)$ of the following wave equation problem:

$$\begin{cases} u_{xx} = u_{tt}, & 0 < x < \pi, t > 0 \\ u(0,t) = u(\pi,t) = 0, & t > 0 \\ u(x,0) = 2\sin 3x,\ u_t(x,0) = \sin 4x, & 0 \le x \le \pi \end{cases}$$

A3. Find the solution $u(r,\theta)$ of the following Laplace equation in the *semicircular* region $r < 1,\ 0 < \theta < \pi$:

$$\begin{cases} u_{rr} + \frac{1}{r}u_r + \frac{1}{r^2}u_{\theta\theta} = 0, & 0 \le r < 1,\ 0 < \theta < \pi \\ u(r,0) = u(r,\pi) = 0, & 0 \le r < 1 \\ u(1,\theta) = f(\theta), & 0 \le \theta \le \pi, \end{cases}$$

assuming that $u(r,\theta)$ is single-valued and bounded in the given region.