Name _____

MATH 302   Partial Differential Equations   Fall 2010   Exam #11

Instructions: Do your own work. You may consult your class notes, the course text, and similar resources from prerequisite courses (calculus, linear algebra, and ordinary differential equations). Do not consult other sources. Do not discuss generalities or specifics of the exam with anyone except me.

   Turn in a complete and concise write up of your work. Show enough detail so that a peer could follow your work (both computations and reasoning). All plots should be carefully drawn either by hand or printed from technology. If you want to include a visualization that cannot be printed (such as an animation), include it as an attachment in an email with "Math 302 Exam 11" as the subject line.

   The exam is due on Monday, December 13 at 2 pm. Note that this is the end of the final exam period scheduled for this course. Reseaonable requests for extensions will be considered.

   Pick *one* of the following two problems to submit.

1. Set up and solve the general Dirichlet boundary-value problem for Laplace's equation on an annular region (that is, the region between two concentric circles). Illustrate a specific non-trivial solution using your own choice of boundary conditions.

2. Consider vibrations of a membrane in the shape of a half-disk with edges held fixed in a plane. Find the five smallest normal mode frequencies. Produce an animation for each of the corresponding modes.