MATH 302   Partial Differential Equations   Fall 2011   Exam #4

Instructions: Do your own work. You may consult your class notes and the course text. 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 4" as the subject line.

The exam is due at the beginning of class on Tuesday, October 25.

For each of the following boundary situations, solve the heat equation $u_t = k u_{xx}$ for $x > 0$ and $t > 0$ with initial condition given by A units of heat energy at $x = a$ (where A and a are positive). Provide understanding and interpretation of each solution. Also, compare the two solutions.

1. the end at $x = 0$ is held at temperature 0 for all $t > 0$

2. the end at $x = 0$ is perfectly insulated for all $t > 0$