Name _____

MATH 302 Partial Differential Equations Fall 2009 Exam #6

Instructions: Do your own work. You may consult your class notes and the course text. You may also consult your texts from prerequisite courses (calculus, linear algebra, and differential equations) for reference on background mathematics. 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.

The exam is due in class on Friday, October 16.

If you want to include animations from *Mathematica*, send me an e-mail with your *Mathematica* notebook as an attachment. Name the file you send `Math302ExamY_XX.nb` where XX are your initials and use "Math 302 Exam Y" as the subject line of the e-mail.

For each of the following boundary situations, solve the heat equation $u_t = ku_{xx}$ for $x > 0$ and $t > 0$ with initial condition given by one unit of heat energy at $x = a$. Makes plots or an animation to illustrate each solution.

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 $t > 0$