PROJECT: (please return by Dec. 6 to your section leader in class)   Math21a

Name:	Date:

Check your section:

MWF 9 Braverman	MWF 10 Chung	MWF 10 Rasmussen	MWF 10 Qui	MWF 10 Karigiannis
MWF 11 Mohta	MWF 11 Rasmussen	MWF 12 Chung	TTH 10 Knill	TTH 11 Goroff

Check one of the following choices. If you choose your own idea, give some details on the back of this form.

Mathematica Lab	Challenge Problems	Textbook Projects	Section Test	Own idea

One of the ways to earn points in Math 21a is to complete a short project related to multivariable calculus. This project is worth up to 200 points towards your term total. The goal is to let you personalize Math 21a by exploring a topic that interests you for course credit. A variety of potential projects are described below. You can use them as your starting point and expand on these suggestions according to your interests, or you can also design a project of your own so long as it is approved by your section leader first. With the exception of the section test, all projects are due in your instructor's mailbox by 5 pm on Friday, January 10. As a rough guide, most written projects should be five to ten pages long. The work you turn in should be your own. It need not be typed, but should be neat, well-presented, and self-contained. Try to create an exposition rather than just a series of calculations, and treat the assignment with at least as much care as you would give a short paper in an English course or a lab report in a Chemistry class. We might post on the website some of the best projects and pictures.

- Mathematica Lab. Mathematica is a very versatile program for performing and displaying computations. It was, for example, used to produce some of the graphics on the Math 21a website. This project involves learning to use Mathematica for drawing curves, surfaces, vector fields, etc. Just download the Mathematica Lab instructions from the course web page. Work through the entire lab, then print out and hand in the material listed. Mathematica is available on public computers at Harvard, and Harvard students can download it for use on their own machines. See instructions on our web page for obtaining your own copy.

- Challenge Problems. Throughout the term, we are posting challenge problems on the course website through links on the homework page. These problems are less routine than the homework exercises, and should require some real thought and imagination on your part. Many deal with generalizations of our coursework to higher dimensions, for example. Problems with four stars are harder than those with three. To do this project, solve and hand in 16 or more stars worth of challenge problems (say,for example, 4 of the four star problems or 6 of the three star ones). Your solutions should be neat and thoroughly explained.

- Textbook Projects. The table of contents of the text lists a number of "Discovery Projects" and "Applied Projects." For example, there is one in Chapter 11 that investigates measurements of a dumpster. Any of these would make an appropriate project. To take this option, just complete, write up, and hand in all parts of a project described in the book.

- Section Test. Each section leader will make up a section test covering material specific to his section, mostly from the last few weeks of class. The exact format and contents of the test will vary from section to section. Your section leader will provide details about the test for your section. To do this project, tell your section leader that you want to take the section test and follow his instructions.

- Your Own Idea. You can also design your own project. Topics related to other fields and applications are encouraged, but what you hand in should not duplicate work in another class. The use of Math 21a techniques should be clear and explicit. If you are interested in doing such a project, speak with your instructor. He or she will consider your idea, perhaps make some suggestions, and approve it if the subject matter and workload seem appropriate.