Math 2573H **Honors Calculus III** **Fall Semester 2015**

Assignment 7 - Due Thursday 10/29/2015

Exercises from Colley:
4.1: 8,10, 11, 16, 18, 22, 34, 38
4.2: 4, 10, 12, 16, 22, 32, 40, 42
4.3: 2, 6, 8, 9, 22, 32

Notes
Section 4.1 is particularly long for what it does. We start with the 1-variable theory, which you don't get tested on, and which probably you know already. If you can skip that, do. The important things to know are that there is a degree k Taylor polynomial about each point which looks like what is in the box on page 256, except that is hard to figure out what it is saying, and that the coefficients can be determined in terms of partial derivatives. The degree 1 case is something we have already done, in that it is the linear approximation to the function. The only thing is that Colley introduces new terminology and notation for this on page 149, in the form of the incremental change and total differential. We don't need these, because we have done them before, and they are not entirely standard. You do need to know the degree 2 case on page 255 involving the Hessian matrix. You don't need to know the forms of the remainder on page 257. If you can focus on the things I just mentioned that we need, it may help.

In section 4.2 the most complicated things are the criteria for whether a critical point is a maximum, minimum or saddle point. There are actually three such criteria. The most rudimentary is to look at points around the critical point and see if the function gets larger or smaller. The other two involve second partial derivatives and the Hessian matrix. The first of these is done by completing the square, and appears on page 266, although Colley does not dignify it with a box and bold print. It is a very good method. The last method is a criterion involving determinants on page 268. Colley suggests that this is an effective method. The trouble is that taking determinants of large matrices is something we can only do on a computer because it is computationally expensive. I do not like this method as much as she does.