Math 3593H Honors Mathematics II Spring Semester 2013

The final exam is on Monday May 13, 1:30-4:30pm in **Vincent Hall 211**. You can see complete information about the common math final exams by going to
http://www.math.umn.edu/undergrad/

Assignment 14 - Do **not** hand this in to be graded, even though some questions are starred. These questions are just to show you what I would suggest.

Read: Hubbard and Hubbard Sections 6.10 and 6.12.

Exercises:
Section 6.10: 1*, 2, 4, 5*, 6*, 7, 8, 9, 10, 11, 12(use the hint), 13, 14.
For question 1, locate from somewhere a formula for the volume of a torus.
The way I see to do question 3 it is a standard result to do with centers of mass, which we have not done; thus I omit this question.
Section 6.12: We have already done questions like 1 and 2,and I am going to steer clear of things like questions 3 and 7 which go into physics. The only useful questions from this section are 1, 2, 4.

Extra Question*: Let B be the half of the unit ball $x^2 + y^2 + z^2 \le 1$ in 3-dimensional space specified by $z \ge 0$. Let S be the surface which is the boundary of B, so S is the union of a unit disc D in the xy-plane and the upper half T of the surface of a sphere. Let S, T and D be oriented by the normal pointing outward from B. By calculating integrals over D and B, compute the flux of F through T, where F is the vector field

$$F\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} x + \cos y + \cos z \\ y + \sqrt{x^2 + 1}\ln(z^2 + 1) \\ z + 3 \end{pmatrix}$$

Comments: If there remains sufficient time I will discuss Newton's theorem about the gravitational field around a spherically symmetric body (not in the book). There will also be a review sheet for the final exam forthcoming.

This has been a great year and it has been a real pleasure and a privilege to teach you!