**Math 3593H** **Honors Mathematics II Spring Semester 2018**

**Assignment 13** - Due Thursday 4/26/2018. The third mid-term exam will be held on this date, on the topics of sections 4.9, 4.10, 5.1, 5.3, 6.1 - 6.6

**Read:** Hubbard and Hubbard Sections 6.7, 6.8, 6.9, 6.10 (see below). Section 6.7 is reassigned from last week because we did not get far enough.

**Exercises:**
Section 6.7: 1 - 11, 2*, 9*, 11*.
Section 6.8: 1, 2, 3, 5*, 7, 10, 11*, 12*.
Section 6.9: no exercises assigned.
Section 6.10: 1, 2*, 3*, 4, 5, 6, 10.

Extra Question*: (a) Find a function f(x,y) such that $\nabla f(x,y) = (2xy + y^3 + 1, x^2 + 3xy^2)$.
(b) Explain why you cannot find an f(x,y) such that $\nabla f(x,y) = (x^2 + 3xy^2, 2xy + y^3 + 1)$.

**Comments:**
The following is repeated from the last HW sheet: I propose not to define the exterior derivative in the way they do in Definition 6.7.1. Instead I think it is more straightforward to define it by means of its algebraic properties, most of which are listed in Theorem 6.7.2. The other two algebraic properties (which we deduce from 6.7.2) are given in 6.7.7 and 6.7.8. The statement of 6.7.1 will then become a theorem, instead of a definition. The homework exercises you are asked to do are done by applying these algebraic properties.

Something like 6.7.1 is needed for the informal proof of Stokes' theorem which we will do in section 6.10 and it is also useful for the interpretation of curl in section 6.8, but you should not trouble yourself too much with it.

We will probably not get through through section 6.10 in the time available this week, but I put questions on this section just in case. In section 6.10 we will not go beyond the informal proof of Stokes' theorem There will be a HW sheet 14, but you will not be asked to hand in any questions from it, so this is the last HW you will hand in.