

**Assignment 12** - Due Thursday 12/6/2018. There is a mid-term exam on this day. This is the last homework set.

**Exercises from Colley:**

7.3: 4, 8, 12, 14, 17, 20

7Misc: 22

8.1: 2, 4, 6, 10

8.2: 9, 12, 15

8.3: 2, 4, 6, 9

**Notes**

The third mid-term exam is on Thursday December 6. It will be on sections 6.1-6.3 and 7.1-7.3. This includes the material on 7.3 that is only due as homework on the day of the exam, but this has partly to do with the previous HW due date being on Tuesday. I think there will be enough time to go over 7.3 in recitation on Thursday this week and Tuesday next week. There are review questions on the back of this sheet.

In deciding what to do with the remaining part of the course, I don't think the examples given in section 7.4 are appropriate because they have too big an investment in physics. Instead, we are going to do differential forms from Chapter 8. Studying them has the effect that we understand the integration theorems of Green, Stokes and Gauss much better. We will mainly use them as a notational convenience and omit everything complicated. I have already been mentioning the formalism of differential forms and the exterior derivative in class.

The big problem with differential forms is trying to figure out what on earth they are, and I don't think the description in the book helps as much as it could. I will try to remedy this in class by telling you exactly what they are. Be warned that what I say may differ slightly from what is in the book. For instance, I will distinguish between a differential form and a differential form field, which is a useful distinction that the book does not make. Also we will omit some parts of the book.

In section 8.1 omit pages 534-5, about the exterior product and be prepared for the pages before that not to make much sense. In section 8.2 we need pages 536-7, pages 538-542 are optional, and pages 543-551 about orientation are not needed. We need all of section 8.3 about the exterior derivative and the interpretation of the integration theorems. She does not mention that the square of the exterior derivative is zero, which is a useful thing to know.