About midterm 2 and the final of
MATH 2205, Multivariate Calculus
Semester 2, 2017

- Midterm 2 is roughly one hour - maybe slightly shorter, maybe slightly longer. The questions will cover differentiation (Sections 12.2-12.7, 12.9) and classifying critical points (part of Section 13.1). This is everything in the slides labelled Weeks 7-10, and all the exercise sheet questions from sheet #13 until sheet #18.
- The final is 2 hours. The questions will cover everything in the course, including material already tested on the midterms.
- Calculators are allowed, for arithmetic only.

About the questions:

- The questions are **not** in order of difficulty. Depending on your speed, you might not have a lot of time, so it is important that you skip any questions that are hard for you and solve everything you find easy first.
- The questions may require you to put together ideas from different topics.
- The questions are in many parts:
  - The parts are loosely related (e.g. they may ask you to do different things with the same function).
  - There are usually both easy parts and hard parts within the same question.
  - You don't always need the answer to part a) to answer part b).
  - Sometimes part b) depends on the information given in the question of part a), but not on the answer to part a).
  - Even when part b) depends on the answer to part a): If you have the wrong answer to part a) and therefore a wrong answer to part b), you may still get full marks for part b) if I think you would've got the right answer if you had the right answer to part a).
- Questions marked "**Explain your reasoning carefully**" are designed to be challenging and to test your conceptual understanding.
  - There will be partial credit for good ideas and attempts, so please attempt something.
  - To get full points, you must explain your answer fully. Make it clear to me that you know what you are doing and are not simply guessing.
- Make sure you know the difference between these questions:
  - "Show that (a, b) is a critical point of f."
  - "Show that (a, b) is the **only** critical point of f."
- Make sure you know the difference between these questions:
  - "Find the volume (or mass, centroid, average value etc.) of R."
  - "**Express as an iterated integral** the volume (or mass, centroid, average value etc.) of R."

The best way to study is to do practice problems:

- Close your notes and redo homework problems or in-class exercises that you had trouble with;
- There are lists of textbook practice problems in the right hand side of the schedule on the class webpage;
- You can look online for more problems - multivariate calculus is a popular course so there are many class webpages that may have good notes or problems. But be careful that different classes teach different material so problems online might be out of our syllabus - if you are not sure, you can email a picture of specific problems to ask whether they are relevant.
- If you want to check your solutions to any problems, you are very welcome to bring them to office hours.

In the exam itself:

- Please bring a pencil or erasable pen to draw your diagrams, so you can keep your diagrams tidy.
- In the final, please start each question on a new page of the answer book. If you are skipping a question, please leave a lot of space. If I cannot find your answer, I cannot give you any points.
- Please show **all the steps** in your calculations: a final answer without full supporting work will not get full credit. If you are given scratch paper, that is for your "experimentation" when you try to find a possible solution. Your official answer must contain the entire solution.
- In multi-step problems, you should double-check your answers after each step, because getting a wrong answer in one step might make the next step much harder. For example:
  - In multiple integration questions, check your limits and your integrand. If you get a very hard or impossible integral, maybe your limits / integrand are wrong, or maybe you made a mistake calculating the first integral in your iterated integral.
  - In extremisation questions, check that your first derivatives are correct, or your equations may be very hard to solve.

The make-up / supplementary exam is harder than the final, to take into account that you had extra time to study. So please don't study so hard that you get sick on the day of the final! Take care of yourselves, eat heathily and get enough sleep.