

Midterm 2 - Topics

- You are required to prepare the following material (see topics on the next page), and only the following material, for Midterm 1. The list refers to the online posted lecture notes. The lectures required to be covered are Lectures 8 – 19 inclusive, up to but **not including Section 19.3**.
- No “cheat sheets” will be allowed, and calculators will be allowed but **not necessary**.
- The midterm will consist of four questions and you will have ten minutes per question.
- The best preparation is to do all the additional assignment problems as well as study the lecture notes closely.
- You should attend office hours if you have any questions before the midterm.
- You can also use chapters 3, 5 and 6 in the book for more examples, but remember the book is a guide and not quite the same as the lecture notes.

Summary of what to know

- Lecture 8 : Taylor’s Theorem. Know the statement of Taylor’s Theorem for functions of several variables, and how to work out the N th order Taylor series.

- Lecture 9 : Know how to determine critical points of a function and their nature, especially using the second derivative test – determinants of Hessian matrices. Know when the matrix is positive or negative definite.
- Lecture 10/11 : Know how to find extremes of a function on a given region (constrained optimization) and how to apply the method of Lagrange multipliers.
- Lecture 12 : Know how to apply Lagrange multipliers for functions with several constraints. Know the statements of implicit and inverse function theorems, and how to find conditions for a system of equations to be solvable for some variables in terms of others.
- Lecture 13 : Know how to do implicit differentiation. Omit justification of Lagrange multipliers.
- Lecture 14/15 : Know the definition of double integrals and Fubini's Theorem. Know how to apply Fubini's Theorem for interchanging the order of integration. **Omit** Mean value theorem. Omit the proof at the end of Lecture 14 justifying Fubini's Theorem.
- Lecture 16 : Know how to evaluate improper double integrals over simple regions using Fubini's Theorem for improper integrals.
- Lecture 17 – 19 : Know how to do multiple integrals. Know the change of variables formula for multiple integrals, and integrals in various standard co-ordinate systems such as polar co-ordinates, cylindrical co-ordinates and spherical co-ordinates.