Final - Topics

• A list of topics is given on the last page. The list of sections on the next page refers to the online posted lecture notes. Bold numbers are sections that must be covered. All others can be totally omitted.

• No "cheat sheets" will be allowed, and calculators will be allowed but unnecessary.

• The final will consist of 6–8 questions and you will have three hours.

• 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 final. Consult the web page for additional office hours in finals week.

• You can also use relevant chapter in the book for more examples (see assignments for those chapters), but remember the book is a guide and not quite the same as the lecture notes.

• I have decided to remove Taylor's Theorem entirely from the list of topics to prepare, as well as improper double and multiple integrals.

• For line integrals and surface integrals, you are only required to be able to evaluate a given integral along a line or surface with, perhaps, having to use Green's Theorem, Stokes' Theorem, the Divergence Theorem in $\mathbb{R}^3$, or conservativity to evaluate the integral. The practice finals reflect what kind of questions will appear. There will be no physical interpretation or theory except to know how to state the three main theorems given above (Green's, Stokes', Divergence).

Sections covered from the lectures

List of sections to study:

02.1	**02.3**	**04.2**	**05.1**	**07.3**	**09.1**
09.2	**09.3**	**10.2**	**11.1**	**12.2**	**13.1**
13.2	**14.1**	**14.2**	**15.1**	**15.2**	**17.2**
18.1	**18.2**	**19.1**	**19.2**	**21.3**	**22.2**
22.3	**22.4**	**23.1**	**23.2**	**23.3**	**24.1**
24.2	**24.3**	**25.1**	**25.2**	**25.3**	**26.1**

Summary of what to know

Definitions and theorem statements: Definition of the limit, Implicit Function Theorem, Inverse Function Theorem, Definition of double integral, Fubini's Theorem for continuous functions, Green's Theorem, Divergence Theorem in $\mathbb{R}^3$, Stokes' Theorem. No other theorems or definitions are examinable.

- Lecture 1 : Omit entirely.
- Lecture 2 : **2.1**, **2.3**. Limit definition. Showing a limit does not exist.
- Lecture 3 : Omit entirely.
- Lecture 4 : **4.2**. Tangent planes.
- Lecture 5 : **5.1**. Know how to find gradients ∇f of vector valued functions.
- Lecture 6 : Omit entirely.
- Lecture 7 : **7.3**. Equality of mixed partial derivatives.
- Lecture 8 : Omit entirely.
- Lecture 9 : **9.1**, **9.2**, **9.3**. Computing Hessians, testing positive and negative definite. Second derivative test.
- Second derivative test example.
- Lecture 10 : **10.2** Constrained optimization.
- Lecture 11 : **11.1** Lagrange Multipliers.
- Lecture 12 : **12.2** Inverse and implicit function theorems.
- Lecture 13 : **13.1**, **13.2**
- Implicit Differentiation Example
- Lecture 14 : **14.1**, **14.2** Definition of double integrals, Evaluating double integrals.
- Lecture 15 : **15.1**, **15.2** Evaluating double integrals, Fubini's Theorem.
- Lecture 16 : Omit entirely.
- Lecture 17 : **17.2** Evaluating multiple integrals.
- Lecture 18 : **18.1**, **18.2**. Change of variables theorem, Classical co-ordinates.
- Lecture 19 : **19.1**, **19.2**. More examples of change of variable.
- Lecture 20 : Omit entirely.
- Lecture 21 : **21.3** The concept of work and work integrals.
- Lecture 22 : **22.2**, **22.3**, **22.4**. Evaluating line integrals, reparametrization, conservative vector fields.
- Lecture 23 : **23.1**, **23.2**, **23.3**. Test for conservativity, line integrals of scalar fields, surface integrals of scalar fields.
- Lecture 24 : **24.1**, **24.2**, **24.3**. Surface integrals of vector fields, parametrizations, the four types of integrals.
- Lecture 25 : **25.1**, **25.2**, **25.3**. Green's Theorem, Divergence Theorem.
- Lecture 26 : **26.1** Flux, Stokes' Theorem.