

MATH 200: Winter Term 2 2018/19

Multivariable calculus, the common website.

Textbooks:

- [CLP-3 website](#) (contains old exam solutions).
[UBC CLP-III Textbook](#) by Professors J. Feldman and A. Rechnitzer. This will be our primary textbook for reading.
- [Apex Calculus](http://www.apexcalculus.com) – <http://www.apexcalculus.com> primary source of suggested problems. The next two references will be used later in the course:
- [Secondary Textbook no. 1](#) ;
<https://www.whitman.edu/mathematics/multivariable/multivariable.pdf>
- [Secondary Textbook no. 2](#).
<https://open.umn.edu/opentextbooks/bookdetail.aspx?bookid=10>

Individual section websites:

- Sections 201 and 202 (Prof. Julia Gordon).
- Sections 203 and 204 (Dr. Tian An Wong) please use Canvas.

Exams and Marking

Course mark will be based on the Webwork (10%), four in-class tests (10% each), and the final exam (50%).

Policies:

- All exams are closed book, but you can bring 1 formula sheet written on both sides. Calculators will not be permitted.
- Missing a test will result in a score of 0, except with prior consent of the instructor or with a doctor's note. In these latter cases, you might be able to take the test with another section, and if that fails, the mark will be re-distributed between the other tests and the final exam.
- After the break, Webwork will generally close at 11:59pm on Monday night (please look at the dates carefully in case there are some deviations). No extensions are possible -- please do not ask.
- If for any reason you have to miss the final exam, it is the university-wide policy that you need to apply for "standing deferred" status through your faculty. Missed finals are not handled by the instructors or the Mathematics Department.

- UBC takes cheating incidents very seriously. After due investigation, students found guilty of cheating on tests and examinations are usually given a final grade of 0 in the course and suspended from UBC for one year. Note that academic misconduct includes misrepresenting a medical excuse or other personal situation for the purposes of postponing an examination or quiz or otherwise obtaining an academic concession.
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Homework

- On Canvas, you will have two different pages for Math 200: "Math 200 ALL" and Math200-your-section-number. The common page "Math 200 ALL" will have the links to webwork, piazza, and some course-wide announcements. Your section's page will eventually have your quiz and midterm marks. All other content will be posted here and on the individual sections' web pages (not on Canvas).
 - Homework assignments should be submitted online through Webwork. To access Webwork, log into Canvas, go to the Math 200 All page (NOT your section's page), and click on "assignments" on the left. You should see only one item "Webwork link". Click on that link; it should open Webwork in a separate window. Then work with Webwork as usual. Please use Piazza as the main resource for help with webwork-related and other questions. It is a forum, which will be monitored by our TA, where you can post questions and answers about webwork. Please use the "e-mail instructor" button in webwork *only* if the question is not answered on Piazza, and you posted it and did not receive an answer. [Sign-up link](#) for our class (all sections) on Piazza. Piazza should also show up on your main menu (on the left) on the Canvas page that is COMMON to all sections.
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Resources

- You can use [Wolfram Alpha](#) -- it is a wonderful tool for plotting graphs of functions of two variables, for example. If you want to visualize, for example, the surface $x^2+xy-y^2+3z=0$, just type in "plot ($x^2+xy-y^2+3z=0$)". A note about Webwork and Wolfram Alpha: there will be many problems in Webwork which require thinking and which Wolfram Alpha cannot do; for the more mechanical ones that it can do, if you just use the software and copy the answers, it detracts from your learning. You might get a few extra points for the webwork problem, but you'll certainly lose much more on the exam for not having that skill. So use this great software to your advantage (to help you visualize the objects we study, and to learn), not to your disadvantage (to cheat on Webwork).
 - See review materials for the exams below the "Announcements" section on this website.
 - [Math Learning Centre drop-in tutoring](http://www.math.ubc.ca/ugrad/ugradtutorials.shtml). <http://www.math.ubc.ca/ugrad/ugradtutorials.shtml>
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Review materials for the final exam

Here are some handouts to help you review (please note that the "detailed list of topics" handout reflects the IIC's personal view of which topics are important).

- [The detailed overview of topics.](#)
 - [a table of integrals and useful integration techniques.](#)
 - [Old final exams with solutions](#) (at Prof. Feldman's site).
 - There are a few giant Webwork sets: (they all have "review" in their name), and more will be added soon. The best way to use them is to generate a pdf file of the problems, look over them to see which you know how to solve, and which ones need more work. Then you can try your answers in webwork. These Webwork sets ARE NOT FOR MARKS; they will NOT affect your final marks, they are just for practice. Do as many or as few problems as you like.
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(Approximate) week-by-week course outline

Chapter numbers in the description of the material are from [CLP-III Calculus](#); chapter numbers in the suggested problems are from [Apex Calculus](#) unless otherwise specified. Please note that this is only an approximate outline; it may be updated as the course progresses. Please also check the individual sections' websites for more specific information about your lectures. Some illustrations and supplemental materials may be posted below the description of a week's lectures, please keep checking.

- **January 2-5:** 1.1 Three-dimensional coordinate systems; distance between points in space. 1.2.1, 1.2.2: Vectors; basic operations with vectors; length of a vector, equation of a sphere in space, unit vector in a specified direction.
- **January 7-11:** 1.2.2: Dot product; Using dot product to find an angle between lines. Optional reading: application to finding forces (1.2.3). Mandatory reading: 1.2.4 -- area of a parallelogram. 1.2.5. Cross product. Using cross product to find a vector orthogonal to two given ones; cross product and area.
- **January 14-18:** 1.3, 1.4 and 1.5: Equations of lines and planes. Symmetric and parametric equations of a line in space. Equations for planes in space. Equations for a line of intersection of two planes, etc. Finding distances in space: distance from a point to a plane, etc.
- **January 21-25:** 1.7, 1.8. 1.9 : Cylinders and quadric surfaces. 12.1 in Apex Calculus: Functions of several variables. Domain and range. Level curves and level surfaces. Brief discussion of limits and continuity for functions of two variables. Section 2.1 in CLP textbook (including 2.1.1).
- **January 29 - February 2** 2.2, Partial derivatives; 2.3 higher-order partial derivatives. Tangent planes (section 2.5 up to (not including) 2.5.2) Linear approximations: 2.6 (up to (not including) 2.6.1).
- **February 5-9.** 2.4 Chain rule and the implicit differentiation examples from 2.2. The gradient and directional derivatives: start 2.7 (not including "optional" examples). One additional topic to recall here: parametric equation of a segment connecting two points A and B.
- **February 11-15.** 2.7 Directional derivatives and gradients, continued. 2.5.2 Gradient as a normal vector to a level surface. Tangent planes to level surfaces. Tangent planes to graphs of functions of two variables, revisited.

- **February 25- March 1.** Section 2.9 Critical points: the second derivative test, absolute maximum and minimum values. Lagrange multipliers (Section 2.10 (without the optional 2.10.1)).
 - **March 5-9.** 2.10 Lagrange multipliers, continued. (two constraints not included). Starting integration: 3.1 (the definitions; area; integral of a function of two variables over a rectangle. Iterated integrals (over a rectangle). Fubini theorem (without proof). **Test 3 (differentiation 2)**
 - **March 11-15:** Double integrals over general regions. Interchanging the order of integration. Sections 3.1, 3.2, 3.3 Polar coordinates (See also Sections 13.3 and 9.4 in [Apex Calculus](#)). Averaging a function of two variables over a domain; Mass and centre of mass. [A summary of integration techniques](#) from Math 101.
 - **March 18-22:** 3.5 Triple integrals. Six different ways of writing a triple integral as an iterated integral. Applications. Triple integrals in cylindrical coordinates. (Section 3.6 in CLP-III) **Test 4 on double integrals, and Lagrange multipliers.**
 - **March 25-29:** Triple integrals in cylindrical coordinates, continued (Section 3.6) Triple integrals in spherical coordinates (Section 3.7). See also 14.4 (from secondary text #2). Note: look at Section 14.4 only up to the end of Example 7 on p. 544 (after that it is interesting reading, but we are not covering it in class).
 - **April 1-4:** Triple integrals in spherical coordinates, continued (Section 3.7). Review. See also 14.4 (from secondary text #2 -- see the note above as to where to stop).
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