

## Math 125: Review for Final Exam for Fall 2016

The final exam is comprehensive, that is, it covers all of the material that has been discussed this semester. Go back over the sections we have covered and be familiar with the concepts, formulas, techniques, and applications that we have considered. You should pay particular attention to the following problems as well as the problems from the three exams and twenty-three quizzes. It should not be necessary to do all of these problems (more than 200); for many of them you should be able to read it and say, “Yes, I know how to do this one.” Remember that you should be able to do all of these problems without referring to the textbook and most of them without a calculator (it should be clear when a calculator is needed).

|                               |                                                                    |
|-------------------------------|--------------------------------------------------------------------|
| 1.1: 3, 6                     | 1.18: 1a, 1b, 1e, 4, 7                                             |
| 1.2: 4, 8, 15                 | 1.19: 3, 4c, 4d, 4e, 5                                             |
| 1.3: 4a, 4c, 5b, 6            | 1.20: 1a–1 $\ell$ , 2, 3, 4, 5, 6b, 7                              |
| 1.4: 1, 2, 3b                 | 1.21: 1b, 1f, 2b, 3c                                               |
| 1.5: 1a, 1e, 1g, 1h, 2        | 1.22: 4, 6, 8, 9                                                   |
| 1.6: 1a, 5b, 7,               | 1.23: 1c, 3b                                                       |
| 1.7: 1b, 1e, 2, 7, 8          | 1.24: 1b, 1d, 1i, 2a, 2d, 2f, 2i, 4c, 5b, 6b                       |
| 1.8: 1c, 1f, 1i, 2, 3, 5      | 1.25: 1c, 1d, 1e, 2b, 2c, 2d                                       |
| 1.9: 1a, 1b, 1e, 1g, 2, 4, 6  | 1.26: 1c, 1d, 4, 7                                                 |
| 1.10: 1a, 1e, 1g, 1h, 3, 5    | 1.27: 1c, 2c, 8                                                    |
| 1.11: 1a, 1b, 1e, 1g, 2, 3, 4 | 1.28: 1b, 1c, 4a, 4b, 4d, 4e, 5, 7                                 |
| 1.12: 1b, 1d, 2, 4            | 1.29: 3b, 4, 12, 15                                                |
| 1.13: 2a, 2f, 2 $\ell$        | 1.30: 1a, 1c, 3                                                    |
| 1.14: 1a, 1f, 1i, 4, 5        | 1.31: 1a, 1d, 3                                                    |
| 1.15: 1, 4, 6, 7, 11, 15      | 1.32: 2a, 2b, 2c, 3, 5, 7                                          |
| 1.16: 1, 2, 5, 17             | 1.33: 1, 3, 5, 6, 9                                                |
| 1.17: 1, 3a, 5, 6             | 1.35: 8, 11, 13, 16, 17, 18, 20, 25, 26, 27, 28a, 28e, 31a, 41, 45 |

You should be able to state Definitions 1.1 (page 10), 1.7 (page 16), and 1.21 (page 52).

(As we have done, you can omit the first sentence of 1.21).

You should be able to state Theorems 1.4 (page 10), 1.14 (page 26), and 1.24 (page 58).

(You can link the two sentences in Theorem 1.14 as “...  $[a, b]$ , then there exist ...”, omitting the rest.)

You should be able to prove Theorems 1.8 (page 16).

You need to be able to use the definition of the derivative to find a derivative.

You should know the types of functions discussed in Section 1.2.

You should know all of the derivative formulas, except those for  $\operatorname{arcsec} x$  and  $\operatorname{arccsc} x$ .

You should know the formula for Newton’s method and where it comes from.

You should know the formulas for polynomial approximation.

The link ‘A Summary of Differential Calculus’ has almost all of the information that you need. You can also go to the page <http://people.whitman.edu/~gordon/> and follow the links ‘Written Exam in Mathematics’ and then try the three links involving Calculus I. There you will find a longer summary, a list of 24 questions, and a full solution set for these questions.

Since many of you are taking college finals for the first time, I will offer some unsolicited advice; just ignore it if not interested.

1. Get plenty of rest during finals week. It is better to know fewer things and be able to think clearly than have your head crammed with information and be exhausted. In the latter case, you are often not able to think and this can lead to all kinds of stupid mistakes.
2. Take time to exercise, even if it is just a short walk to look at the Christmas lights in the neighborhoods around campus. Our physical bodies need attending to as well as our minds. You might be surprised how a short walk or workout will improve your thinking or at least your attitude.
3. In reviewing for the final exam in calculus, make sure you know all of the basic things first: memorize formulas/definitions/theorems/proofs, think about typical skills, and understand key concepts, then move on to the more advanced sorts of problems. Be certain that you know how to start the problems, remembering that the problems on the exam will not have a section heading to give you a clue as to what to do. A problem or two on the exam will be intended as a challenge so do not freak out if you are unable to do one or two of the problems. Most of the problems will be of the sort you have seen on homework, quizzes, exams or in the review problems you should be doing.
4. A quick sports analogy: homework is the scrimmage, tests are the games, and the final is the playoffs. I want to see what you have learned and remembered over the semester. Come to the exam prepared to think and work hard for three hours if necessary. This is a long time in some ways, but it often feels like it goes by quickly when you are working hard on solving problems. In any event, you need to be prepared mentally for this sort of academic enterprise.
5. The heading on the exam will read as follows: (the usual heading)

Write neat, concise, and accurate solutions to each of the problems below—I will not give partial credit for steps I cannot follow. Include all relevant details, use correct notation, and finish problems with a complete sentence when appropriate. No electronic devices are allowed for this exam. Each problem is worth (TBD) points.

Pay attention to what this means and keep it in mind as you write your solutions on the exam. (I have not yet determined how many problems will be on the exam, but the total number of points will be 80.)

6. Think carefully before you start each problem. Read the problem to make sure you know what it is asking and pause for at least a few seconds to make sure you know what you should be doing. If you are completely stumped, move on to the next problem and come back to it later. However, it is best not to do this too often as too much jumping around wastes time and can create errors. Avoid negative thoughts while taking the exam (I'm going to do poorly on this exam, I can't do this kind of problem, etc.). Replace these thoughts with positive ones and either ignore the negative ones or at least save them for after the exam. You want to avoid the snowball effect of negative attitudes keeping you from doing the problems you already know how to do. It is a good idea to pause every so often during the exam and take a few deep breaths.

My office hours for the week will be posted on my door and/or sent to you in an email. Come by if you have questions or send me an email. I wish you well as you navigate the week of final exams and projects.