

Final Review for 16C Hillel Raz

The following is a study guide. It lists the topics that will definitely be on the final and those that a few questions will be selected from. You can look at it as one of those travel guides that gives you a plan according to the amount of time you have to spend in a city or a region: if you have 3 hours to study, definitely review those topics that will be on the final. If you have 6 hours to study, in addition to those topics mentioned above, review the concepts that could be on the final. If you have 10 or more hours to study, do practice problems from the chapter reviews, review your old midterms and the practice midterms and the examples done in class, and if possible your homeworks.

Most of the questions on the final will be questions you have already seen, changed a bit. Good luck!

Topics that will DEFINITELY be covered on the final

- Solving First-Order Linear Differential Equation. (Section C.3)
- Modelling a problem using differential equation and solving a given model. (Section C.4)
- Domain/Range for functions of many variables. (Section 7.3)
- Partial derivatives of functions of multiple variables. (Section 7.4)
- Finding extrema of functions of multiple variables by the Second-Partial test (Section 7.5) or via Lagrange multipliers if you are given a constraint. (Section 7.6)
- Evaluating double integrals and switching the order of integration. (Section 7.8)
- Convergence/Divergence of Series. (Section 10.2)
- The Geometric Series. (Section 10.2)
- The p-Series and the Ratio test. (Section 10.3)
- Taylor Series for Sine and Cosine. (not covered in the book, some more notes are available on the website)
- Applications of Taylor Series. (Section 10.5)

From the following list, a few topics will be covered, though **not all** of them will be on the final for certain.

Topics that could be covered on the Final:

- Finding a particular solution of a differential equation. (Section C.1)
- Separating variables in order to find the solution of a differential equation. (Section C.2)
- The distance-formula and the midpoint formula for the three dimensional coordinate system. Also the equation of a sphere, the center and the radius of it. (Section 7.1)

- Classifying and drawing a Quadric Surface. (Section 7.2)
- Finding the volume of a solid or the average value of a function over a region. (Section 7.9)
- Figuring out the patterns of sequences. (Section 10.1)
- The Harmonic Series and why it diverges. (Section 10.3)
- Power Series, radius of convergence and interval of convergence. (Section 10.4)
- Taylor Series for non-trigonometric functions. (Section 10.4)

For possible questions, look at old midterms and practice midterms, class notes and homeworks. For practice, you can do the chapter review questions on the subject or other problems in the book.

Here are questions from the last week that we hadn't covered yet on any practice midterm:

- 1) Find the Taylor series for $\sin x$ and for $\cos x$ centered at 0. What happens if you center it at π ? How about at $\frac{\pi}{2}$?
- 2) Use your answer from above to write out the Taylor series for $\sin(-2x^3)$ and for $\cos(\sqrt{7x})$.
- 3) Write out the 10th degree Taylor Polynomial for $\cos x$ and for $\ln(x+1)$. (You do not need to memorize the Taylor Series from page 687, you will be given or asked to derive whatever Taylor Series you will need).
- 4) Using 3) above, evaluate $\int_0^1 \ln(x+1) dx$ and $\int_0^1 \cos(x) dx$