

- The test is **6.10 → 8.10 in EX 310** on Tuesday, July 22, 2014. Please arrive about 5 minutes early, so that we can start on time.
- The test will have 6 questions, covering the material from lectures and assignments up to, and including, July 15.
- More precisely, it covers: 2.4 → 2.6. Please make sure you are comfortable with this material. If you're not, ask the instructor or TA during office hours, or ask a friend as soon as possible.
- Please use the discussion board for posting questions.
- Extra office hours will be as follows:
M 4-6pm in Math Dept Lounge - 6th Floor Bahen (Dranovski), Tu 2-4pm in BA 6283 (Lishak)
- There are no calculators, notes, books or other aids allowed.
- Remember to bring your student ID to the test.
- Below is a list of some things that you should know. I make no claim that there is nothing missing from this list. I will promise that nothing on the test is independent from the course. (I'm not trying to trick you with this list, of course. I just do not want 100 people yelling at me after the test. So use the list below as a guide, but make sure you are good with the assignment and practice problems.)

Things to know for the test

- **Previous Material** - While the test will only cover recent material, the knowledge and skills from the previous test, quizzes and assignments are often necessary for new material and for problem solving. In particular, you still need to know how to solve equations, factor, convert to polar coordinates, parametrize curves, etc. You should be able to find a power series for simple functions. You should know the formulae for the coefficient of a power series, as well as the power series expansions of e^z , $\sin z$, $\cos z$, $\frac{1}{1-z}$, and how to use these for other simple, related functions.
- **Zeroes** - You should know what it means for a function f to have a zero of order n at a point z_0 , and what that means for the power series of f centered at z_0 . You should be able to find zeroes of simple functions and determine their order. Don't forget...trig functions have infinitely many zeroes, so you can't ignore infinitely many of them and expect full marks. Please be mindful that for rational functions $\frac{P}{Q}$ you need to fully factor both the top and bottom when trying to find zeroes and their orders. If a function $\frac{P}{Q}$ is not defined at z_0 , it can't have a zero there. It is often useful to know that if f has a zero of order n at z_0 and g has a zero of order m at z_0 , then $f \cdot g$ has a zero of order $n + m$ at z_0 .
- **Isolated Singularities** - You should know what an isolated singularity is, and how they are classified. You should know that $e^{\frac{1}{z-z_0}}$ has an essential singularity at z_0 . Outside of this example, you do not need to know other examples of essential singularities. You should know how to find and classify all the isolated singularities of a function. For rational functions, you should factor top and bottom, and be mindful of factors that appear in both the numerator and denominator. You should be able to find the order of a pole, and to determine the Laurent series for a function around a pole, with given conditions on convergence.
- **Residues** - You should know how a residue of a pole is defined (as an integral), and you should know the various ways to compute it (by coefficient in Laurent expansion and hence by differentiating the "g(z)" an appropriate number of times, by $\text{Res}(\frac{P}{Q} : z_0) = \frac{P'(z_0)}{Q'(z_0)}$ when it applies...be warned, it does not always apply!!!!). You should know the Residue Theorem, and how to use it to compute line integrals.
- **Real Integrals** You should be able to use the Residue Theorem to compute real integrals. For this test, you should know how to compute real integrals of the form $\int \frac{P}{Q}$ where

$\deg P + 2 \leq \deg Q$. You should also know how to compute real integrals of the form $\int \frac{P(x)}{Q(x)} \sin x dx$
or $\int \frac{P(x)}{Q(x)} \cos x dx$.

Extra Review Problems

Here are some extra review problems. Do as many as you need to feel comfortable and confident about the material. Don't forget to look back at the problems already assigned, either as HW, or as practice. (There is likely to be some repetition between these problems and the previous assignment and practice problems.)

- (1) 2.4 # 1, 3, 5, 13
- (2) 2.5 # 1, 3, 5, 7, 9, 11, 22,
- (3) 2.6 # 1, 3, 5, 23(a)
- (4) Go through your notes from class, and solve the examples *on your own*. (I.e. don't just skim the examples and their solutions, do the problems yourself, without looking at the solutions until after you've solved it completely.)
- (5) Go over your quiz, and make sure you understand any mistakes you made.

Tips for Studying

Please (please, please, please, ...) don't wait until the night before the test to start studying. If you find out then that you don't know something, it is doubtful that you'll have anybody to help you.

Math is like everything else: you need to practice to succeed. Do as many problems as you can. The more you do, the easier they become.

Aim to get to the point where you can answer problems without looking things up in the book. Practice until you can't make a mistake, rather than until you get it right once.

For many people it can be helpful to write things out. Take your notes, or the book, and make a full list of all the definitions and theorems that we've talked about. The simple act of writing something explicitly yourself can help you internalize it.

Many of the things in this course (definitions, theorems, proofs) has a picture that go with it. For more visual thinkers, make a list of each definition and theorem together with the appropriate picture, if applicable.