Summer 2016
Math 132 Complex Analysis for Applications
Final Exam General Information

What to do if you have an exam conflict

As announced in the course syllabus, Exam II will be given in lecture on **Thursday, July 28, 2016** at the usual lecture time **11:00am-12:50pm)** in **Boelter 5249**. If you cannot make the exam due to serious illness requiring a doctor's note or a family emergency, you must notify me by email as soon as possible. There are no makeup exams. You must take the final exam to pass the course.

What to bring to the exam

Be sure to bring enough pens, pencils, and erasers. No calculators, notes, or electronic devices will be allowed. All cell phones and portable electronic devices must be turned off and put away during the entire exam.

Tips on exam taking

Don't rush. The exam will be designed to take 50 minutes, but you will have an extra 10 minutes to work and check your solutions. If you get stuck on a problem, it is best to move on to the next problem. Do all the problems you understand well first, and then come back to finish the ones you find more challenging to maximize the number of points you will receive on the exam. You must write a complete organized solution in order to receive full credit.

Exam content

Many of the exam questions will be similar to problems on the homework assignments, examples covered in class, and examples in the textbook. There will be five problems (some with multiple parts). Some problems may be theoretical, while others may be computational in nature. The exam covers the material from the sections of our textbook listed below.

- **All Sections and Topics from Exam I and Exam II Study Guides**

- **V.7 The Zeros of an Analytic Function**
  Definition of a zero of order N at z_0 of a nonzero function f analytic at z_0

$$
\begin{aligned}
f \text{ has a zero of order } N \text{ at } z_0 \iff & f(z) = \sum_{n=N}^{\infty} a_n (z-z_0)^n \text{ with } a_N \neq 0 \\
\iff & f(z) = (z-z_0)^N \sum_{n=0}^{\infty} a_{n+N} (z-z_0)^n \text{ with } a_N \neq 0 \\
\iff & f(z) = (z-z_0)^N g(z) \\
& \text{where } g(z) \text{ is analytic at } z_0 \text{ and } g(z_0) = a_N \neq 0
\end{aligned}
$$

  Definition of f analytic at ∞ having a zero of order N at ∞

$$
\begin{aligned}
f \text{ has a zero of order } N \text{ at } \infty \iff & g(w) = f(1/w) \text{ has a zero at } w = 0 \text{ of order } N \\
\iff & g(w) = \sum_{n=N}^{\infty} b_n w^n \text{ with } b_N \neq 0 \quad |w| < \frac{1}{R} \\
\iff & f(z) = g(1/z) = \sum_{n=N}^{\infty} b_n \left(\frac{1}{z}\right)^n \text{ with } b_N \neq 0 \quad |z| > R
\end{aligned}
$$

  Definition of a simple zero (zero of order 1). Definition of an isolated point. If f is an analytic function that is not identically zero on a domain D, then the zeros of f in D are isolated. Uniqueness principle: If $f(z)$ and $g(z)$ are analytic on a domain D and if the set E of z in D such that $f(z) = g(z)$ has a non-isolated point, then $f = g$ on D. Principal of Permanence of Functional Equations

- **VI.1 The Laurent Decomposition**

- **VI.2 Isolated Singularities of an Analytic Function**

- **VI.3 Isolated Singularity at Infinity**

- **VI.4 Partial Fractions Decomposition**

- **VII.1 The Residue Theorem**

- **VII.2 Integrals Featuring Rational Functions**

- **VII.3 Integrals of Trigonometric Functions**

Integrals with Branch Points and the Argument Principle will NOT be covered on the Final Exam.