Class 32 **(Monday April 13)**

SUMMARY Review for Second Exam

Here is a brief summary of all the topics that we have considered in this second half of the course:

- complex functions of a real variable
- Arcs, curves, contours
- Parametrization
- Differentiation and antidifferentiation of complex functions of a real variable
- Contour integration
- $\oint (z - z_0)^n dz = 2\pi i \delta_{n,-1}$
- Antiderivatives of analytic functions
- Cauchy-Goursat Theorem
- Deformation Invariance Theorem
- Path Independence Theorem
- Simply and Multiply Connected Domains
- Cauchy Integral Formula
- Generalized Cauchy Integral Formula
- Liouville's Theorem
- Cauchy's Inequality
- Maximum and minimum modulus theorem(s)
- Analytic functions are infinitely differentiable
- Zeroes and poles
- Classification of singularities (isolated, removable, branch and essential)
- Residues
- Cauchy's Residue Theorem
- Laurent Series
- Applications of Laurent Series to Contour Integration
- Cauchy's Second Residue Theorem
- Applications of Residues to Real Trigonometric Integrals
- Applications of Residues to Real Improper Integrals (Jordan's Lemma)