

Mathematics 118 Review for Midterm I
October, 2005

Definitions you should know:

1. Analytic function.
2. Convergent sequence, convergent series, absolutely convergent series.
3. Uniformly convergent series of functions.
4. Open set, closed set, connected set.
5. Isolated singularity.
6. Residue of a function at an isolated singularity.
7. Removable singularity, pole, essential singularity.
8. Path integral $\int_{\gamma} f(z)dz$.

Theorems you should be able to (state and) prove:

1. Derive Cauchy-Riemann equations.
2. Cauchy integral theorem from Green's theorem and Cauchy-Riemann equations.
3. Cauchy integral formula from Cauchy integral theorem.
4. Existence of power series expansion, using Cauchy integral formula and expansion of geometric series.
5. Liouville's theorem from Cauchy estimates.

Theorems/formulas you should be able to state/reproduce:

1. Morera's theorem.
2. Taylor formula for coefficients of a power series.
3. Cauchy integral formulas for higher derivatives of an analytic function, or equivalently for the coefficients of a power series.
4. Cauchy estimates for derivatives. (Easily derived from previous item!)

Be able to do typical computations from the homework.