Topics to study for Midterm 1

Conditions for convergence of a series expansion

Derivative and integral of series

Series expansion of simple functions such as $e^x$, $\sin x$, $\cos x$, $\sinh x$, $\cosh x$, $1/(1+x)$, etc.

Binomial expansion

Three different forms of complex numbers

Add, subtract, multiply and divide complex numbers

Calculations of all roots of an equation

Derivative of a complex function

Derivative of a complex function in terms of partial derivatives of real and imaginary parts ($u(x, y)$ and $v(x, y)$)

Cauchy-Rieman Conditions or relations of partial derivatives of $u(x, y)$ and $v(x, y)$ for an analytic function

Calculation of $u(x, y)$ from knowledge of $v(x, y)$ and vice versa

Cauchy’s integral theorem

Cauchy’s integral formula

$n$th derivative of an analytic function calculated at a given point

Taylor and Laurent expansion of a complex function

Singular points (pole of order $m$, simple pole, and essential singularity)