Department of Mathematics & Statistics
Concordia University

MATH 366 (MATH 601), Sec. AA

Complex Variables

Fall 2017

Instructor: Dr. J. Harnad, Office: LB 901-25 (SGW), Phone: (514) 848-2424, Ext. 3242
Email: j.harnad@concordia.ca

Prerequisites: Math 264/265 or an equivalent multivariable calculus course.

Text: *Complex Variables and Applications,* 9th Edition (2014) by J. W. Brown and R. V. Churchill (McGraw-Hill Education).

Assignments: Assignments are *very important* as they indicate the level of difficulty of the problems that the students are expected to solve and understand. Therefore, every effort should be made to do and understand them *independently*. The assignments will be corrected and a representative sample graded, with solution sets posted weekly. These grades together are worth a maximum of 10%.

Use of Computer Algebra System: It is optional but much recommended to install and use Maple or Mathematica. These computer tools can be used to verify and illustrate any analytical results you get while doing your assignment problems.

Calculators: Electronic communication devices (including cell phones) are not allowed in examination rooms. Only "Faculty Approved Calculators" (**SHARP EL-531** or **CASIO FX-300MS**) are allowed in examination rooms during mid-term and final.

Test: A midterm test covering the first seven weeks will be given in week 8, worth 30% of the total grade

Final Grade: The highest of the following:

- 100% final exam
- 30% midterm, 10% assignments, and 60% final exam.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Approximate schedule of topics

Week	Chapters	Topics	Assignments	Due date
1	1	Complex number: algebraic properties; complex plane; conjugates, polar form; roots		Sept. 14
2	2	Analytic functions 1: mappings, limits, continuity, derivatives, Cauchy-Riemann equations,		Sept. 21
3	2	Analytic functions 2: harmonic functions, examples, reflection principle		Sept. 28
4	3	Elementary functions: exponential, complex exponts, trigonometric functions, hyperbolic functions, inverses		Oct. 5
5	4	Integrals 1: Contours, contour integrals, branch cuts, connected domains, antiderivatives, Cauchy-Goursat theorem; Cauchy integral formula		Oct. 12
6	4	Integrals 2: Liouville's theorem, maximal modulus principle		Oct. 19
7	5	Series: Convergence, Taylor series, Laurent series, absolute and uniform convergence		Oct. 26
8		Midterm test, closed book (Chapters 1-5)		Nov. 2
9	6	Residues and poles: Isolated singular points, poles, residues, Cauchy residue theorem, residues at poles, zeroes of analytic functions, behaviour near isolated singular points		Nov. 9
10	7	Applications of residues: Improper integrals; indented paths, integration along a branch cut; definite integrals involving sines and cosines, argument principle		Nov. 16

11	8	Mapping by elementary functions: linear transformations, inverse map, linear fractional transformations, mappings of the upper half-plane, w=sin z, z^2, z^(1/2), Riemann surfaces (intro)		Nov. 23
12	9	Conformal maps: preservation of angles, local inverses, harmonic conjugates, boundary conditions		Nov. 30
13	1 - 9	Review		

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: concordia.ca/students/academic-integrity." *[Undergraduate Calendar, Sec 17.10.2]*