King Abdulaziz University
Faculty of Science
Mathematics Department

Math 413
Complex Analysis

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Text Book:
Dennis G. Zill and Patrick D. Shanahan, Complex Analysis, 1st edition, Jones & Barlett Learning, 2003

Office Hours:

Grading:

Assessment	Type of assessment	Time	Grade
Exam 1	Written exam	Week 6	20
Open book Exam	Written exam	Week 10	10
Exam 2	Written exam	Week 11	20
Report	Writing a report		10
Final Exam	Written exam	Week 15	40

Material Covered:

Chapter 1.
Complex Numbers and the Complex Plane
1.1 Complex Numbers and Their Properties
1.2 Complex Plane
1.3 Polar Form of Complex Numbers
1.4 Powers and Roots
1.5 Sets of Points in the Complex Plane

Chapter 2.
Complex Functions and Mappings
2.1 Complex Functions
2.2 Complex Functions as Mappings
2.3 Linear Mappings
2.4 Special Power Functions
2.4.1 The Power Function zn
2.4.2 The Power Function z1/n
2.5 Reciprocal Function
2.6 Limits and Continuity
2.6.1 Limits
2.6.2 Continuity

Chapter 3.
Analytic Functions
3.1 Differentiability and Analyticity
3.2 Cauchy-Riemann Equations
3.3 Harmonic Functions

Chapter 4.
Elementary Functions
4.1 Exponential and Logarithmic Functions
4.1.1 Complex Exponential Function
4.1.2 Complex Logarithmic Function
4.2 Complex Powers
4.3 Trigonometric and Hyperbolic Functions
4.3.1 Complex Trigonometric Functions
4.3.2 Complex Hyperbolic Functions

Chapter 5.
Integration in the Complex Plane
5.2 Complex Integrals
5.3 Cauchy-Goursat Theorem
5.4 Independence of Path
5.5 Cauchy's Integral Formulas and Their Consequences
5.5.1 Cauchy's Two Integral Formulas

Chapter 6.
Series and Residues
6.2 Taylor Series
6.3 Laurent Series
6.4 Zeros and Poles
6.5 Residues and Residue Theorem

Syllabus Math 413

Chapter 1

Section	Example	Read	Exercise
1.1	1 , 2 , 3	47, 50, 51.	1, 3-11 , 15,17,19, 25,26, 27,29, 31, 35,45.
1.2	1 , 2	Example 3 33, 34, 36, 37, 38.	1, 3, 8, 9, 11, 13, 15, 17, 19, 27, 31.
1.3	1,2,3,4	40,43,44,45.	1,3,5,9,11,13,14,15,19,25,29,31,33,37(a)
1.4	1	Example 2,21, 27.	1,4,5,9,15,17,19(a,b)
1.5	1,2	35,39,40, 43(a,c,e),44	1,3,5,13,17,21,23,25,27,30

Chapter 2

Section	Example	Read	Exercise
2.1	1,2	27(a,b,d,e),28(a,b,c), 29a,32(a,c),35	1(a,b,c),2(a,b),6b, 7(a,b) 9,11,15,21,23,25
2.2	1,3,4	2	1,3,5,9,11,17,19,23,25
2.4.1	1	Example(2,3)	1, 5,7, 9,15,17,21.
2.4.2	5(a,b),9(a,b)	Example(5c,8)	25,29,31,33,43.
2.6.1	1,2,3,4	4,13	1,4,5,7,11,13
2.6.2	5,7	39,45,46	27,31,35

Chapter 3

Section	Example	Read	Exercise
3.1	**1,2,3**	**32**	**1,3,5,11,17,19,32**
3.2	**1,2,3**		**1,3,5,9,17,19,23 25,27**
3.3	**1,2**	**18**	**3,7,9,11**

Chapter 4
Self-study
(30min dissection-1hr open-book exam, 10 marks)

Section	Example	Read	Exercise
4.1	**1,2,3,4,5**		**1,3,5,9,13,21,23,29,33,48**
4.2	**1,2,3**		**1,5,9,17**
4.3	**1**		**1,3,5**

- without the concept of mapping for all functions

Chapter 5

Section	Example	Read	Exercise
5.2	1,2,3,4	9	1,3,5,7,11,17,21,23,25
5.3	1,2,3,4,5	27(a,b),28(a)	1,3,9,11,15,17,19
5.4	1,4,5	Example(2,3)	3,5,9,11,13,15,17
5.5.1	1,2,3	Example4,28	1,3,7,11,15,17,20,21

Chapter 6

Section	Example	Read	Exercise
6.2	1,2	9,40	1,5,13,15,19,21
6.3	1,2,4,6	Example (3,5)	4,5,7,11,13,17,21,25,27
6.4	1,2,3,4	31	1,3,5,9,13,15,21,25,27,29
6.5	1,2,3,4,5,6,8	Example7,36	1,3,5,7,9,13,15,17,21,25,27,31