

Math 699 Directed Study

Math 623 Complex Variables

Text: Complex Variables and Applications (Seventh Edition)
by

James Ward Brown and Ruel V. Churchill, *McGraw Hill* (2003)

Course Description

Elementary functions of a complex variables and their mapping properties, series, complex integrals, calculus of residues, conformal mappings and their applications, Poisson integral formula, etc.

Prerequisites

Standard three-semester sequence in calculus and analytic geometry; one semester of advanced calculus or one semester of advanced mathematics for engineers and physicists.

Format

The course consists of 12 lessons listed below. Each lesson has some suggested problems and a written assignment. *You need to submit only the written assignments* to the Independent Learning Program for grading by the instructor. The lessons are worth 70% of your course grade. There will be *two proctored exams*, each worth 15% of your course grade. The first exam is to be taken after successful completion of the first seven lessons, and the second exam is to be taken after successful completion of the remaining five lessons.

A substantial amount of self-motivation is required for independent study at this level since study notes are not available. You may wish to consult other books on the subject. A good reference is *Complex Variables* by Murray R. Spiegel, Schaum Outline Series (McGraw Hill).

Lesson 1**Suggested Problems**

Section 2, page 4: 2, 3, 8, 9, 10

Section 3, page 7: 1, 2, 5, 6

Section 4, page 11: 2, 5

Section 5, page 13: 1, 3, 10, 15, 16

Section 7, page 21: 2, 3, 4, 5, 7, 8, 11

Section 9, page 28: 2, 5, 8

Section 10, page 31: 4, 5, 6, 7, 9, 10

Written Assignment 1

Section 2, page 4: 1, 4, 5

Section 4, page 11: 1, 3, 4

Section 5, page 13: 2, 7, 11

Section 7, page 21: 1, 6, 10

Section 9, page 28: 1, 3, 4, 7

Section 10, page 31: 1, 2, 3, 8

Lesson 2

Suggested Problems

- Section 11, page 35: 2, 4
- Section 13, page 42: 1, 2, 8
- Section 17, page 53: 2, 3, 4, 8, 10, 11
- Section 19, page 59: 1, 4, 6, 8
- Section 22, page 68: 1, 2a,b,c, 3, 4a,c, 7, 8, 9

Written Assignment 2

- Section 11, page 35: 1, 3
- Section 13, page 42: 3, 7
- Section 17, page 53: 1, 5, 9, 13
- Section 19, page 59: 2, 9
- Section 22, page 68: 2d, 4b, 5, 10

Lesson 3

Suggested Problems

- Section 24, page 73: 1a,b, 2c, 3, 4a,b
- Section 25, page 78: 1a,d, 2, 4, 7
- Section 27, page 84: 1, 3, 4

Written Assignment 3

- Section 24, page 73: 1c,d, 2a, 4c, 7
- Section 25, page 78: 1b,c, 3, 8, 9
- Section 27, page 84: 2, 5

Lesson 4**Suggested Problems**

Section 28, page 89: 1a,c, 5, 6

Section 30, page 94: 2, 5, 7, 8

Section 31, page 96: 1, 4

Section 32, page 99: 1, 3, 4

Written Assignment 4

Section 28, page 89: 1b, 8, 10, 11

Section 30, page 94: 1, 4

Section 31, page 96: 2

Section 32, page 99: 2, 6

Lesson 5**Suggested Problems**

Section 33, page 103: 1, 2, 4, 5a, 9, 11, 12a

Section 34, page 107: 2b, 4, 6, 15b

Section 35, page 110: 1a,c,d, 2a

Written Assignment 5

Section 33, page 103: 5b, 10, 12b, 16, 18

Section 34, page 107: 2a, 7, 8, 15a, 16

Section 35, page 110: 1b, 2b, 3

Lesson 6

Suggested Problems

Section 37, page 115: 1, 2a,b, 4, 5

Section 38, page 120: 2, 5

Section 40, page 129: 1, 3, 7, 8, 10

Section 41, page 133: 1, 3, 4

Written Assignment 6

Section 37, page 115: 1c, 3, 7

Section 38, page 120: 6

Section 40, page 129: 2, 4, 6, 11

Section 41, page 133: 5, 6

Lesson 7

Suggested Problems

Section 43, page 141: 1, 2, 4

Section 46, page 153: 1a,b,c, 2a,b, 3, 4, 7

Section 48, page 162: 1a,c,d, 2, 3, 5

Section 50, page 171: 1, 5

Written Assignment 7

Section 43, page 141: 3, 5

Section 46, page 153: 1d,e,f, 2c, 6

Section 48, page 162: 1b,e, 4, 6, 7

Section 50, page 171: 2, 4, 6

Exam 1

Lesson 8**Suggested Problems**

Section 52, page 181: 1, 3, 8

Section 54, page 189: 1, 2, 5

Section 56, page 198: 1, 3, 8

Section 60, page 212: 2, 3, 5, 8

Section 61, page 219: 1, 2, 3

Written Assignment 8

Section 52, page 181: 4, 9

Section 54, page 189: 3, 7, 13

Section 56, page 198: 6, 9

Section 60, page 212: 1, 4, 6

Section 61, page 219: 4, 5

Lesson 9

Suggested Problems

Section 64, page 230: 1a,b,c,d, 2a,d

Section 65, page 233: 2

Section 66, page 238: 1, 2, 4, 5

Section 69, page 245: 1, 2, 4a, 6, 7, 9

Written Assignment 9

Section 64, page 230: 1e, 2c

Section 65, page 233: 1, 3

Section 66, page 238: 3, 6

Section 69, page 245: 3, 4b

Lesson 10**Suggested Problems**

Section 72, page 257: 1, 2, 5, 6, 8

Section 74, page 265: 1, 4, 12

Section 77, page 276: 1, 2

Section 78, page 280: 1, 4

Section 80, page 285: 1a,c, 2, 6, 7

Written Assignment 10

Section 72, page 257: 4, 7

Section 74, page 265: 2, 5

Section 77, page 276: 4

Section 78, page 280: 2, 5

Section 80, page 285: 1b, 8, 9

Lesson 11

Suggested Problems

Section 84, page 301: 1, 2, 3

Section 85, page 305: 2

Section 87, page 312: 1, 3, 5, 9

Section 88, page 316: 1, 3

Section 89, page 322: 2, 4

Section 90, page 328: 1

Written Assignment 11

Section 84, page 301: 5

Section 85, page 305: 3

Section 87, page 312: 2, 6, 7

Section 88, page 316: 6

Section 89, page 322: 1

Section 90, page 328: 2

Lesson 12**Suggested Problems**

Section 96, page 350: 2, 3, 5

Section 99, page 358: 1, 5, 6

Section 103, page 370: 2, 3, 6, 9

Section 108, page 386: 1, 3

Section 118, page 425: 3, 4, 7

Written Assignment 12

Section 96, page 350: 1, 4

Section 99, page 358: 4, 9

Section 103, page 370: 1, 4, 8

Section 108, page 386: 2, 4

Section 118, page 425: 2, 5

Exam 2