

Math 185—Introduction to Complex Analysis
Haiman, Summer 2014

Problem Set 5

Due Monday, July 21

Reminder: the Midterm Exam is Thursday, July 17, in both class hours. You will need to bring your own **blue books** and scratch paper.

You can bring and consult the class textbook and any notes which you have written yourself. Other printed materials are not allowed. No computers, calculators, phones, audio players or other electronic devices may be used.

The exam will cover all material on Problem Sets 1 through 4, that is, Chapter 1 through Chapter 4, §53 in the text, skipping sections 28 and 29. You may expect exam problems to be similar in difficulty to homework problems.

Exercises from the textbook:

57.1(b), 57.5, 57.7, 57.8, 57.10

59.2, 59.3, 59.6

61.4

65.1, 65.2, 65.5, 65.11

Additional problems:

1. If C is a positively oriented (*i.e.*, counterclockwise) simple closed curve that does not pass through 0, 1, or -1 , what are the possible values of

$$\int_C \frac{1}{z(z^2 - 1)} dz,$$

and for which curves does each value occur? Hint: expand in partial fractions.

2. Use the Gauss mean value theorem, Chapter 4 Section 59 (2), to prove the identity

$$\int_0^{2\pi} e^{\cos \theta} \cos(\sin \theta) d\theta = 2\pi.$$

Hint: take $f(z) = e^z$ and choose a suitable circle C_ρ .