

Math 295 - Fall 2020

Redo HW 2

See separate instruction sheets for submission deadlines

Please turn in this assignment on Gradescope.

New problems: Graduate students must attempt all of the integrals below at least once; undergraduate students are strongly encouraged to attempt all of them.

This problem covers objectives D1, D2, D3, D4, and E6. Those are five different techniques to compute a complex integral. To get a score on an objective covering a certain technique, solve **two** integrals using that technique. You may solve the same integral several times to score on different objectives, as long as you solve the integral again using each technique.

If you are a graduate student, you must make sure to solve each integral at least once, but if you do not need to get a score on any particular objective you can use any technique you want to compute each integral.

Problem 1 : (Objectives D1, D2, D3, D4, E6) Find the value of each of the following integrals:

a) $\int_{\gamma} z dz$, where γ parametrizes the half circle from 1 through i to -1

b) $\int_{\gamma} z dz$, but now γ parametrizes the unit circle

c) $\int_{\gamma} \frac{1}{(z-2)^2(z+2)} dz$, where γ parametrizes the circle of radius 1 around $z = 2$

d) $\int_{\gamma} \frac{1}{(z-2)^2(z+2)} dz$, but this time γ parametrizes the circle of radius 1 around $z = -2$

e) $\int_{\gamma} \frac{\cos z}{\sin^2 z} dz$, where γ parametrizes the unit circle

Repeat problem: All students may solve this problem if they wish to improve their objective score E4.

Problem 2 : (Objective E4) Please do HW 9, problem 1 a), and HW 9, problem 3 a). More specifically, to score on this objective you must

a) Find the region of convergence of the series

$$\sum_{k=0}^{\infty} \left(\frac{1}{z-3} \right)^k ;$$

and

b) find the region of convergence of the series

$$\sum_{k=-2}^{\infty} \frac{(-1)^k (z-2)^k}{4^{k+3}}.$$