

MATH 300.202
Assignment 8

Due: Wednesday, March 8

Note: *You do not need to hand in your solutions to the starred problems.*

I. Section 4.1: 1, 8

II. Section 4.2: 1 (show via Riemann sums), 3(c, d), 5, 6, 16, 17

*III. Show that for every smooth positively-oriented closed curve γ ,

$$\int_{\gamma} \bar{z} dz = 2i \times \text{area enclosed by } \gamma .$$

III. Section 4.3: 1(c, f, h), 2*, 4, 6*, 11

IV. Without using Cauchy's integral theorem, argue that $\int_{\gamma} \frac{1}{z} dz = 2\pi i$, where γ is the ellipse $4x^2 + 9y^2 = 36$, oriented counter-clockwise.

[HINT: We know $\oint_{|z|=1} \frac{1}{z} dz = 2\pi i$ (verified in the class). Use the fact that in some domains, the function $\frac{1}{z}$ has anti-derivatives. Alternatively, you can use the idea of problem 4.3.6.]

V. Section 4.4: 3, 10(c, d)