COMPLEX VARIABLES
FALL 2024

ASSIGNMENT 9.3
DUE NOVEMBER 6

Exercise 1. Textbook exercise 2.1.8.

Exercise 2. Textbook exercise 2.1.12.

Exercise 3. Let $f(z) = P(z)/Q(z)$ where P and Q are polynomials and $\deg Q \geq \deg P + 2$.

a. Show that if $R > 0$ is sufficiently large, then there is a constant M such that

$$\left|\frac{P(z)}{Q(z)}\right| \leq \frac{M}{|z|^2} \quad \text{for} \quad |z| \geq R.$$

b. If C_R denotes the circle of radius R centered at the origin (with either orientation), explain why

$$\int_{C_R} f(z)\,dz$$

is defined for all sufficiently large $R > 0$ and use part **a** to show that

$$\lim_{R\to\infty} \int_{C_R} f(z)\,dz = 0.$$