

Reading: Textbook, rest of Chapter 1, first two sections of Chapter 2

Practice problems: (don't hand these in)

1. Compute

$$\int_{\gamma} x dz$$

where γ is the directed line segment from 0 to $1 + i$.

2. Compute

$$\int_{|z|=r} x dz,$$

where the circle is traversed in the positive direction (i.e., counterclockwise), in two ways.

First, use a parametrization and second by observing that $x = \frac{1}{2}(z + \bar{z}) = \frac{1}{2} \left(z + \frac{r^2}{z} \right)$ on the circle.

3. Compute

$$\int_{|z|=2} \frac{dz}{z^2 - 1}$$

where the circle is traversed in the positive direction.

4. Textbook page 30, problem 25(b)

Problems to hand in:

1. Suppose that $f(z)$ is analytic and that $f'(z)$ is continuous in a region that contains the closed curve γ . Show that

$$\int_{\gamma} \overline{f(z)} f'(z) dz$$

is purely imaginary.

2. Assume that $f(z)$ is analytic and satisfies the inequality $|f(z) - 1| < 1$ in a region Ω . Show that

$$\int_{\gamma} \frac{f'(z)}{f(z)} dz = 0$$

for every closed curve γ in Ω .

3. If $P(z)$ is a polynomial and C denotes the circle $|z - a| = R$, what is the value of

$$\int_C P(z) d\bar{z} ?$$

4. Textbook page 30, problem 25 (a),(c)