

Assignment #4

Due: Thursday, March 27, 4:00 pm

You are being evaluated on the presentation, as well as the correctness, of your answers. Try to answer questions in a clear, direct, and efficient way. Sloppy or incorrect use of technical terms will lower your mark. Also indicate which theorem you are using.

1. Evaluate the following integral along the line segment from $-1 + i$ to i

$$\int_{\Gamma} \frac{dz}{z^2 + 4} dz.$$

2. Let Γ be a path from $z = 0$ to $z = 1 + 2i$ consisting of the line segment from 0 to 1, and from 1 to $1 + 2i$.

- (a) Evaluate $\int_{\Gamma} (z + 2\bar{z}) dz$.
(b) Is this path integral independent? Explain.

3. Evaluate the following integral along the contour γ , where γ is the boundary of a square whose sides lie along the lines $x = \pm 4$, $y = \pm 4$ described in the positive direction.

$$\int_{\gamma} \frac{z^n}{(z + 3)^{n+1}} dz$$

4. Evaluate, if possible, the following integrals, where Γ is the positively oriented circle $|z| = 1$. Repeat for $|z| = 2$.

(a) $\int_{\Gamma} \frac{e^z}{z^2(z - i)} dz$

(b) $\int_{\Gamma} \frac{\sin z}{z(z^2 + 2)} dz$

(c) $\int_{\Gamma} \frac{\cosh z}{z^3} dz$