

1. Show that

$$\int_C f(z) dz = 0$$

where C is the circle $|z| = 2$ oriented clockwise for each function below:

- (a) $f(z) = ze^{-z}$
(b) $f(z) = \frac{1}{z^2 + 9}$

2. If C is the unit circle $|z| = 1$ oriented clockwise, then is

$$\int_C \text{Log}(z + 3) dz = 0 ?$$

Why or why not? Recall that $\text{Log} z$ is the principal logarithm where $|z| > 0$ and $-\pi < \arg z < \pi$.

3. Evaluate

$$\int_C \frac{dz}{z^2 - 1}$$

where C is the circle $|z| = 2$ oriented counterclockwise.

4. Evaluate

$$\int_C \frac{\cos z}{z(z + 2)} dz$$

where C is the square of side 6 centered at $z = 0$ and oriented counterclockwise.

5. Evaluate

$$\int_C \frac{e^z}{(z - \pi)^3} dz$$

where C is the square of side 4 centered at $z = 0$ oriented counterclockwise.

6. Evaluate

$$\int_C \frac{2z + 1}{z^4 - 2z^2 + 1} dz$$

where C is the circle $|z| = 10$ oriented clockwise.