

Math 417 Homework 5

Due October 9

1. Let C be circle of radius 1 centered at the origin, oriented counterclockwise. Determine $\int_C \bar{z}^2 dz$.

2. Let C be the contour starting at $z = -1$, going around the circle $|z| = 1$ counterclockwise, and ending out at $z = -1$ again. Find $\int_C \frac{\text{Log}(z)}{z} dz$.

3. Let S be the line segment connecting i to 1, oriented either way. Show that $|\int_S \frac{1}{z^2} dz| \leq 2\sqrt{2}$.

4. Let C be the circle of radius $R > 3$ centered at the origin, oriented either way. Show that $|\int_C \frac{z^3+1}{z^2+4z+3}| \leq 2\pi \frac{R(R^3+1)}{(R-3)(R-1)}$

5. Show that z^{i+1} is an antiderivative for $(i+1)z^i$ on $A = \{x+iy : x > 0\}$. Use this to find an expression for $(i+1) \int_C z^i dz$, where C is a contour lying in A connecting $\frac{1-i}{\sqrt{2}}$ to $\frac{1+i}{\sqrt{2}}$