

QUESTION

Find $\int_{\alpha} \text{Log}z dz$ where α is the contour defined by $z = e^{\pi it}$ for $0 \leq t \leq \frac{1}{4}$.

ANSWER

Put $z = e^{\pi it}$, so $dz = \pi i e^{\pi it} dt$, and $\text{Log}z = i\pi t$ and we get $\int_{\alpha} \text{Log}z dz = -\pi^2 \int_0^{1/4} t e^{\pi it} dt$ which we evaluate using integration by parts.