

1. Evaluate the following integrals:

(a) $\int_{\gamma} \sin z \, dz$, where γ is the unit circle

(b) $\int_{\gamma} \frac{\sin z}{z} \, dz$, where γ is the unit circle

(c) $\int_{\gamma} \frac{\sin z}{z^2} \, dz$, where γ is the unit circle

(d) $\int_{|z|=1} \frac{\sin e^z}{z^2} \, dz$

3. Let f be analytic on $\{z \text{ such that } |z| > 1\}$. Show that if γ_r is the circle of radius $r > 1$ and center 0, then $\int_{\gamma_r} f$ is independent of r .

5. Evaluate $\int_{\gamma} f$, where $f(x + iy) = x^2 + iy^2$ and γ is the line joining 1 to i .

7. Let f be analytic on the open connected set A and suppose that there is a $z_0 \in A$ such that $|f(z)| \leq |f(z_0)|$ for all $z \in A$. Show that f is constant on A .

19. Let $f = u + iv$ be analytic on a region A . Indicate which of the following are analytic on A :

(a) $u - iv$

(b) $-u - iv$

(c) $iu - v$