Q1: Use Cauchy's Integral Theorem to find the complex integration \( \int_C \frac{dz}{z^2+4} \) where \( C \) is the unit circle \( z(\theta) = e^{i\theta} \) (counterclockwise)

Solution:

- \( C = \{ z : |z| = 2 \} \)
- \( z = \pm 2i \) but \( z = \pm 2i \) lie outside the circle \( z = e^{i\theta} \).

So, \( f(z) = \frac{1}{z^2+4} \) is analytic inside \( C \).

By Cauchy's Integral Theorem \( \int_C \frac{dz}{z^2+4} = 0 \)