

(1) Compute

$$\int_{\gamma} \frac{e^{\pi z}}{z^2 + 1} dz$$

where γ is the circle of radius 2 with centre at the origin.

(2) Evaluate

$$\int_0^{2\pi} \frac{\cos 2\theta}{5 - 4 \cos \theta} d\theta$$

where γ is the unit circle.

(3) Evaluate

$$\int_{-\infty}^{\infty} \frac{dx}{(x^2 + 1)(x^4 + 4)}$$