

Higher Mathematics in English II

Exercises IV:

Complex Integration

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1. Calculate the integral

$$\int_L \bar{z} \, dz$$

where L is the boundary of the triangle with vertices at 0, 1, and i .

2. find the residue of

$$f(z) = \frac{\pi \cot(\pi z)}{z^2}$$

at $z = 0$.

3. Calculate the integral

$$\int_C dz \frac{z^3}{z^2 + 5z + 6}$$

where C is the unit circle $|z|$.

4. Calculate the integral

$$\int_{-\infty}^{\infty} \frac{dz}{z - i}.$$

5. Calculate the integral

$$\int_{-\infty}^{\infty} dz \frac{\cosh z}{z^2 + 1}.$$

6. Find

$$\int_C \frac{dz}{z^4 + z^3 - 2z^2}$$

where C is the circle $|z| = 3$.