

23204 Introduction to Complex AnalysisS h e e t 8

Exercise 1

Calculate the residues:

- (i) $\text{Res}_{-3} \frac{z^2 - e^{-z} + \sin z}{z+3};$
- (ii) $\text{Res}_0 \frac{\sin(z^2) - e^{3z}}{z^2 + z^3 - z};$
- (iii) $\text{Res}_{-2} \frac{\cos(2\pi z^{-2}) + ze^z}{\sin(\pi z)}.$

Exercise 2

Evaluate the integrals:

- (i) $\int_{\partial\Delta_2(0)} \frac{e^z}{(z^2 - z)(z-3)(z-4)} dz;$
- (ii) $\int_0^{2\pi} \frac{\sin\theta}{(2 + \sin\theta)(3 + \cos\theta)} d\theta;$
- (iii) $\int_{-\infty}^{\infty} \frac{x^4 - x^2}{x^6 + 27} dx;$
- (iv) $\int_{-\infty}^{\infty} \frac{x^2 e^{i\lambda x}}{x^4 + 16} dx, \lambda > 0;$