

Problem sheet 11
March 23rd, 2004

MT290 COMPLEX VARIABLE

Note: some of the residues have been calculated on the previous example sheet !

Ex. 1

Calculate the following two integrals:

$$\int_{-\infty}^{\infty} \frac{\cos x}{(x^2 + 1)(x^2 + 4)} dx, \quad \int_{-\infty}^{\infty} \frac{\sin x}{(x^2 + 1)(x^2 + 4)} dx.$$

Ex. 2

Calculate the integral

$$\int_C \frac{1}{e^z + 1} dz$$

around the circle $C : |z| = 3$ and around the circle $C : |z| = 4$.

Ex. 3

Prove (using Complex variable techniques) that

$$\int_{-\infty}^{\infty} \frac{x^2}{(x^2 + 1)(x^2 + 4)} dx = \frac{\pi}{3}.$$