

**Course 2325 2010 Complex Analysis I****S h e e t 4**

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Due: at the end of the lecture next Monday

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**Exercise 1**

Calculate the residues:

(i)  $\operatorname{Res}_0 \frac{z^2 - e^z}{z^5 - z}$

(ii)  $\operatorname{Res}_1 \frac{\cos(2\pi z) - z}{e^{z-1} - 1}$

**Exercise 2**

Evaluate the integrals:

(i)  $\int_{|z|=2} \frac{e^z}{(z^2+z)(z+5)} dz;$

(ii)  $\int_0^{2\pi} \frac{\sin\theta}{5 - \cos\theta} d\theta;$

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