

The University of Edinburgh
2010

School of Mathematics
(U01457)

Geometry & Convergence
Problem Sheet 4

Assessment 4 due by 12.10 on Friday, 26 February 2010.

Tutorial 4 on Tuesday, 23 February 2010.

Tutorial questions: 1, 3, and 5.

Handin questions: 2, and 4.

Conics

(1*) Put the following conics into standard form.

(i) $\mathcal{X}_0 : 7y^2 + 2xy + 7x^2 = 1.$

(ii) $\mathcal{X}_1 : 7y^2 + 2xy - y + 7x^2 + 11x = 1.$

(iii) What is the length of the semi-minor (resp. semi-major) axis of \mathcal{X}_0 ?

(iv) What is the centre of \mathcal{X}_1 ?

(3*) Put the following centred conics into standard form simultaneously.

$$\mathcal{X}_0 : 95y^2 + 216xy + 130x^2 = 1,$$

$$\mathcal{X}_1 : 222y^2 + 480xy + 278x^2 = 1.$$

Do these conics intersect?

(5*) Prove by induction that $n^2 - n + 2$ is always even for $n = 1, 2, \dots$