Queen Mary
University of London

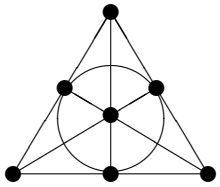
MTHM024/MTH714U Group Theory

Introductory Problem Sheet 13 October 2011

The problem sheets in this course are for "formative assessment" only; there is no coursework component in the assessment.

Any work handed in by the lecture on the date at the top of the sheet will be marked and returned to you in the next week's lecture.

1 The figure below is the *Fano plane*, a configuration of seven points and seven lines. A *symmetry* is a permutation of the seven points which carries lines to lines.



(a) Let a, b, c and A, B, C be two triples of distinct points, neither of which forms a line. Show that there is a unique symmetry of the Fano plane carrying the first to the second.

(b) Show that the symmetries of the Fano plane form a group G of order 168.

(c) Describe the Sylow subgroups of G.

(d) Show that G is simple.