Abstracts of Australasian Ph D theses

On the Mathieu group M23

Nita Bryce

The main theorem of the thesis is:

MAIN THEOREM. *Let G be a finite non-abelian simple group of order* 10,200,960 . *Then G is isomorphic to M_{23} .*

We have thus affirmed that all the Mathieu groups are uniquely determined by their order. The unique determination by order of the Mathieu groups M_{12}, M_{24}, M_{11} and M_{22} has been proved by R.G. Stanton (Ph.D. thesis, University of Toronto 1948) and D.L. Parrott (Ph.D. thesis, Monash University 1969).

Using the Sylow theorems and block theoretic arguments as developed primarily by R. Brauer, the structure of the centralizer of an involution in the centre of a Sylow 2-subgroup in G is found. A result of Z. Janko which characterizes the Mathieu group M_{23} in terms of the centralizer of a central involution is used to complete the proof of the theorem.