Abstracts of Australasian Ph D theses

The deficiency of finite groups

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It is well known that a bound for the deficiency of a finite group is given by its Schur multiplicator and that this bound is exact for finite abelian groups. However, R.G. Swan has shown this not to be true in general by giving a family of groups with trivial multiplicator and non-zero deficiency.

In the first part of the thesis it is shown that the multiplicator also gives the exact bound for the deficiency of finite metacyclic groups and a group invariant is developed which gives the exact deficiency of the Swan groups.

Next a theorem of I.R. Šavarević is extended by showing that if the minimal number of generators of the multiplicator of G is n , where G is a finite nilpotent group, then G is the maximal nilpotent factor group of K , where K is a group with deficiency $-n$. The corresponding theorem relating to finite soluble groups is also proved, and a theorem due to M. Rosen is extended relating the multiplicator of G to a factor module of R/R' where $G = F/R$ is a finite p-group, F a free group.

Finally some new classes of three generator, three relation, finite groups are exhibited. These being

$$G(\alpha, \beta, \gamma) = \{a, b, c \mid c^{-1}ac = a^{\alpha} , \; cbc^{-1} = b^{\beta} , \; c^{\gamma} = a^{-1}b^{-1}ab\}$$

and

$$G(\alpha, \beta, \gamma) = \{a, b, c \mid c^{-1}ac = a^{\alpha} , \; c^{-1}bc = b^{\beta} , \; c^{\gamma} = a^{-1}b^{-1}ab\} .$$

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