## THE NOVEMBER MEETING IN LOS ANGELES

The five hundred eighteenth meeting of the American Mathematical Society was held at the University of Southern California, Los Angeles, California, on Saturday, November 12, 1955. Attendance was approximately one hundred, including 88 members of the Society.

By invitation of the Committee to Select Hour Speakers for Far Western Sectional Meetings, Professor Paul Garabedian delivered an address on *The mathematical theory of three-dimensional cavities and jets*. He was introduced by Professor J. W. Green. Professors R. S. Phillips and L. J. Paige presided at the sessions for contributed papers.

Following are the abstracts of papers presented at the meeting, those whose numbers are followed by "*t*" having been given by title. Mr. Steger was introduced by Professor A. V. Martin, Dr. Nitsche by Professor Stefan Bergman, and Dr. Banaschewski by Professor D. B. Summer.

### ALGEBRA AND THEORY OF NUMBERS

**40. D. L. Boyer:** *Enumeration theorems in infinite Abelian groups.*

W. R. Scott [Amer. J. Math. vol. 74 (1952) pp. 187–197] has proved that an Abelian group of order $A > \aleph_0$ has $2^A$ subgroups of order $A$ and the intersection of all the subgroups is the identity. He has proved in the same paper that the intersection of all the infinite subgroups of a countable Abelian group $G$ is the identity unless $G = Z(p^\infty) \oplus F$, where $F$ is finite. The present paper extends the remaining parts of the above theorem to include countable Abelian groups. It is also pointed out that the above theorem is valid for modules over a principal ideal ring provided the order of the ring is less than the order of the module. Finally it is shown that the order of the automorphism group of a countable torsion Abelian group is $2^{\aleph_0}$. (Received September 26, 1955.)

**41. D. H. Lehmer:** *On the roots of the Riemann zeta function.*

Calculations are described which show that the first 10,000 roots of the Riemann zeta function in the upper half plane have real parts of 1/2. The calculations were done on the SWAC in a few hours time. The basic computation consisted in evaluating a real multiple $[\exp(\pi i\theta)]\zeta(s)$ of the zeta function at the first 10,000 Gram points. Later steps were taken to dispose of doubtful situations by a refined mesh. Use was made of a suitably modified formula of Titchmarsh. Finally two near misses of the Riemann Hypothesis had to be examined by the Euler-Maclaurin formula using 2000 terms of $\sum n^{-s}$ (35 seconds) to obtain a small error. Two pairs of nearly coincident roots with serial numbers 4763, 4764, 6707, 6708 were computed. The latter pair have imaginary parts of 7005.0629 and 7005.1006. The zeta function exhibits a disregard for Gram's Law which increases with $t$. Over 800 violations were found. In five cases there are three roots between two consecutive Gram points. (Received October 6, 1955.)