by Exponential Sums; Dr. P.G. Rooney (University of Toronto),
Representation by Transforms.

ABSTRACT OF THESIS

Philip J. LAUFER, The structure of left H^*-algebras, pre-
sented at McGill University, May 1958 (Supervisor, J.E.L. Peck).

A left H^*-algebra A is an algebra which is also a Hilbert
space and satisfies the following further conditions. 1) For
each x in A there is an x^* in A such that for all y and z
in A, $(xy,z) = (y,x^*z)$. 2) The mapping $x \rightarrow x^*$ is continuous.
3) $xA = 0$ implies that $x = 0$.

The purpose of this thesis is to investigate the structure
of the above algebras. Ambrose [Trans. A.M.S. vol. 57,
1945] determined the structure of proper H^*-algebras. The
essential difference between a left H^*-algebra and a proper
H^*-algebra is that for the latter, the following condition is
also used: $(xy,z) = (x,zy^*)$. In addition, a proper H^*-algebra
is assumed to be a Banach algebra. For a left H^*-algebra
however, this can be proven by using the condition that the
mapping $x \rightarrow x^*$ is continuous. The structure which is obtained
for a left H^*-algebra is as follows: A left H^*-algebra is the
direct sum of simple left H^*-algebras and each simple left
H^*-algebra is isomorphic (in the algebraic sense) to a full
matrix H^*-algebra.

A Kaplansky-Stone-Weierstrass theorem is also obtained.
Specifically, let A be a left H^*-algebra and B a closed self-
adjoint subalgebra with the following property: for any two
distinct regular maximal left ideals in A, B contains an ele-
ment in one but not in the other. Then $B = A$. Kaplansky
[Trans. A.M.S. vol. 70, 1951] has proved the above theorem
for a class of algebras which he calls CCR-algebras.

RANDOM NOTES FROM THE SECRETARIAT

As most of us are avid of personal news, I shall start with
a few notes that may be news to some of you and which interest
me particularly since they have to do with friends most of whom
are old students of mine...Raoul Bott is going from Michigan to
Harvard where he has been elected to a full professorship at the
age of 36. Bott was an engineering student at McGill where he
received the B.Eng. degree in 1945 and the M.Eng. in 1946.
From 1949-51 he was assistant to Marston Morse at the Institute
for Advanced Study... Louis Nirenberg who also graduated from
McGill in '45 and who has been at New York University since '45
recently received the Bôcher prize of the American Mathematical
Society. This is, so far as I know, the first occasion on which
a Canadian has received the Bôcher prize. ... Another of our
McGill honours mathematical graduates, Nathan Keyfitz, comes
in for special mention. He has been in the Dominion Bureau of
Statistics for many years, except when he has been in far away
parts in South America, India or Burma setting up a census or
taking part in the Colombo Plan, and is leaving the Bureau to go
to the Department of Political Economy of the University of
Toronto ... There is also news about two other McGill graduates
of 1945, both of whom are on the McGill staff. J. Lambek has
a Canada Council grant and will spend next year at the Institute
for Advanced Study, and Martin D. Burrow has grants from both
the Canada Council and the Nuffield Foundation in support of a
busman's holiday in Britain during the coming summer.

Hans Zassenhaus is this year visiting professor at the
California Institute of Technology and thereafter will be at Notre
Dame University ... Z.A. Melzak is leaving McGill to take a
place in the Bell Telephone Laboratories. Melzak won the Har-
vard fellowship connected with the William Lowell Putnam prize
competition and later took his Ph.D. at the Massachusetts Instit-
ute of Technology. He then went for two years as a research
fellow at the University of Michigan and is now completing his
second year on the McGill staff. ... J.E.L. Peck is leaving for
Calgary where he will be on the staff of the University of Alberta.
Peter Scherk is leaving the University of Saskatchewan to become
professor at the University of Toronto. I don't know how long
Peter has been at Saskatchewan as my records don't go back be-
fore the time of the first congress in 1945 but I know that he rep-
resented Saskatchewan and gave a paper on the Four-Vertex
Theorem at the first congress and has, with the exception of two
years as visiting professor at the University of Pennsylvania,
been there ever since. We all know what an outstanding job he
along with Lambek, Peck and others at McGill has done in de-
veloping the newsletter and the Canadian Mathematical Bulletin.

On a recent trip to Toronto, Hamilton and London I picked up a bit of news which may be of interest. A.H. Wallace, who is to be one of the lecturers at the forthcoming seminar, has unfortunately decided to join the southward flight and will be at Indiana University. R.B. Potts, who has been at Toronto for several years, is returning to Australia to be professor at Adelaide...However, not everybody is leaving Toronto! Barron Brainerd is migrating from the University of Western Ontario to Toronto and I understand that J.R. Vanstone, who has been out in South Africa with Hanno Rund at Durban where he recently finished his Ph.D. thesis on one of our South African fellowships, will be going to Toronto. At Hamilton, among others, I saw J.H. Chalk who expects to leave for England shortly, and fly back with P. Erdös and H. Davenport to attend the forthcoming number theory seminar at Boulder, Colorado. At London I joined forces with Dr. H.R. Kingston, who was for many years dean and professor of mathematics at the University of Western Ontario, to call on the London Life and the Northern Life both of which companies are long time supporters of the work of the Congress. I had breakfast with Barron Brainerd and Arwel Evans, the latter of whom is poised to join the southward flight. He recently was awarded his Ph.D. from Cambridge on the basis of a thesis written under the direction of A.S. Besicovitch whom many of us will remember as one of the research lecturers at the Halifax seminar and who is now visiting professor at the University of Pennsylvania. Dr. Kingston very kindly arranged for me to meet all the members of the Maths Department who were in town, at lunch.

After a very pleasant trip I came home to find my desk piled high with letters. As these are random notes I shall continue with the inspiration of these letters which are, unfortunately, unanswered. First I see a note from Mary Roberts, a teacher in the high school at Caledonia, Queen's Co., Nova Scotia, who attended our summer school at Lunenburg last summer. After spending some years at the University of London she migrated to Canada and after teaching two years has had the good fortune to win one of the Canada Council scholarships, which will enable her to take a year off from teaching and complete the work for her B.A. degree at Acadia University. I wish that these scholarships were better known and quote from the Canada Council announcement of scholarships, fellowships and grants:

> "Scholarships of an average value of $2,000 (plus an allowance for necessary travel by the scholar) tenable in Canada or abroad for one year, or for a shorter period and a smaller amount in accordance with the nature and duration of the programme proposed, for teachers in secondary schools and librarians, to study or do other work to improve their qualifications in the arts, humanities and social

sciences (which for this purpose will be taken to include mathematics). Employers will be expected to make an appropriate salary allowance to successful candidates. Completed applications and supporting letters must reach The Canada Council office by January 31."

Three of those who attended the Lunenburg summer school last summer applied and two were successful, the other being Donald Archibald, Principal of St. Mary's Rural High School, Sherbrooke, Guysboro Co., N.S. He will commute from his farm home to St. Francis Xavier University at Antigonish. ...Next I find a letter from Rose-Aimée Fournier. This young woman passed the New Brunswick school leaving examinations last year at the age of 14 although she knew no English at all two years earlier. She now has a special scholarship from the Congress at the Collège Notre Dame d'Acadie in Moncton and writes excellent letters both in English and in French. I hope that she will make a good teacher of mathematics in a part of the country where they are very much in demand. ...I now turn up a letter from Professor H. Freudenthal of Utrecht with regard to coming to Canada as one of the research lecturers at Fredericton. He will have a very busy summer as he is to be the chairman of the International Colloquium on Algebraic and Topological Foundations of Geometry, which is being held at Utrecht August 3 - 7 under the auspices of the International Mathematical Union.

As I am the treasurer, perhaps I should say something about finances. Although last year was a year of recession, contributions to the general fund increased by about ten per cent which brought the total collections for 1958 up to nearly $50,000. In 1959 the grant from the National Research Council to the general fund will be increased from $5,000 to $10,000. The Sun Life has increased its subscription from $1,000 to $3,000 and the Canada Life has become a sustaining member ($1,000). While there will be some decreases, I believe that we can count on the subscriptions to the general fund amounting in 1959 to $60,000. The total amount contributed by the National Research Council is, if we include only amounts paid to the treasurer of the Congress, $46,500, but if we include all the grants made by it to universities for mathematical scholarships and fellowships the total will be about $75,000. It is gratifying to see that there has been such a great increase of support of mathematics since the foundation of the Congress in 1945, but we are, perhaps, only at the beginning and certainly there is a great need of developing our activities in many directions among which I may mention particularly summer schools for high school teachers and prizes and scholarships. The usual summer school for high school teachers in the Atlantic provinces will be held at Mount Allison University, Sackville, N.B. Mount Allison University will give its usual courses for first and second year students, and the

145

Congress summer school will offer refresher courses and advanced courses. The Congress staff will include, in addition to Lee Ritcey and myself, W.S.H. Crawford of Mount Allison, David Haley of Acadia and A.J. Tingley of Dalhousie. ...The Summer Institute of Modern Mathematics will be held at the University of Alberta with R.V. Andree of the University of Oklahoma and Max Wyman as the teaching staff. The Congress will award eight scholarships of $300 and three scholarships of $200 at the Summer Institute. ...Our scholarship programmes in Nova Scotia, New Brunswick and Alberta will be carried on in the usual way as will the prize and scholarship contest in Manitoba. ...I am glad to say that a prize and scholarship contest is being initiated in the Province of Quebec. It will be limited to students in high schools and classical colleges on the Island of Montreal, and about 650 students have already entered the contest. We hope and expect that the area of the contest will be broadened next year to the whole of the province. ...In Ontario there seems to be less need for scholarships at the University entrance level than in other provinces, but there is a great need of scholarships for mathematical graduates of the universities who wish to become specialist teachers of mathematics in the high schools and collegiate institutes. You will perhaps recall that we initiated eight such scholarships several years ago on the suggestion of Gilbert Robinson, and I am glad to see that they are now bearing fruit. At the nadir there were only four students taking the course leading to the type A certificate. This number increased in 1958 to eleven and will increase still further next year. I feel sure that our offering these scholarships has had a good deal to do with the increase and the Ontario College of Education is very appreciative of these scholarships, as many of the students would find it difficult or impossible to take this course without this scholarship aid. In Ontario also we are awarding prizes amounting to about $1,000 to students who make outstanding records in the difficult problems paper of Grade XIII, and are also cooperating with the actuaries in carrying on the Mathematical Association of America examinations. ...Brief mention has been made above of our South Africa scholarships. I have just received news that the Anglo American Corporation of South Africa and associated companies will renew their grant of £700 a year in support of these scholarships for a further period of three years. I recall that the three appointees on this interchange are: J.R. Vanstone mentioned above, Carl Templin, a graduate of Toronto who spent a year doing graduate work at Wisconsin, who like Vanstone is at Durban with Hanno Rund, and I.Z. Bouwer of Stellenbosch, who is just now completing his first year at Toronto. I hope that the interchange scheme may be broadened to include other parts of the Commonwealth. Perhaps an earnest of an interchange with the antipodes is the recent appointment of a young Australian, J. Dixon of Melbourne to a fellowship at McGill where he will work with H.W.E. Schwerdtfeger. The Congress will pay a substantial

146

part of his travelling expenses and his other expenses will be covered by one of the National Research Council grants mentioned above. Both Bouwer and Dixon expect to attend the summer seminar at the University of New Brunswick.

One thousand copies of L.J. Mordell's "Reflections of a Mathematician" have just reached our office. This booklet of fifty pages has been handsomely produced for us by the Cambridge University Press and contains an attractive photograph of the author. Perhaps I should recall that Louis Mordell is one of the oldest friends of the Congress as he was the British representative at the first congress at Montreal in 1945. Subsequently he was research lecturer at the first seminar at Toronto in 1947 and was visiting professor at the University of Toronto for two years. He is now visiting professor at Mount Allison University. Those who would like to get a copy of the "Reflections" hot off the Press, may obtain one by sending $1.00 (plus exchange if it is a cheque) to the Secretariat.

Lee and Jean Ritcey were formally introduced to the mathematical community of Montreal and vicinity at a dinner held at the Cercle Universitaire on December 9. In addition to a very good representation from the Ecole Polytechnique, McGill University, The University of Montreal and other Montreal institutions, our president and past presidents, Jeffery, Pouliot and Robinson were present. It was a very happy occasion and reminded us that it is almost time to begin preparations for the fourth quadrennial congress which will be held at the University of Montreal in 1961. Thus in sixteen years we shall have, so to speak, squared the circle, for the first Congress was held in Montreal in 1945.

W.L.G.W.

OPENINGS IN MATHEMATICS

McMaster University: There will be an opening in our Department of Mathematics beginning July 1, 1959. The Department is particularly interested in appointing an Applied Mathematician because of the development of an Engineering School and the recent construction of a Nuclear Reactor. Applications are invited and interested persons should write to the Chairman of the Department of Mathematics, Hamilton College, McMaster University, Hamilton, Ontario.

147