

NEWS

Personal Items

- Professor Les Foulds, of Waikato University, New Zealand, who works in Applied Graph Theory, is presently visiting UCD and TCD.
- Professor Hansjorg Wacker, of the Institut der Mathematik of the University of Linz, will be visiting the Mathematics Department of NIHE Limerick during the month of July. Professor Wacker works in Industrial Mathematics.
- Professor Dan Luecking, of the University of Arkansas at Fayetteville, will be visiting TCD during the Autumn term this year.
- Ted Hurley has been appointed to an Associate Professorship in Mathematics at UCG.
- Donal O'Regan has joined the Mathematics Department in Maynooth College.
- David Spearman will be visiting the University of Montpellier during the Autumn term.

Second September Meeting of the IMS Maynooth College, September 7-8

Following the great success of the Society's First September Meeting in TCD last year, it was decided to expand this event to a two-day meeting. The Second September Meeting will take place in Maynooth on Thursday September 7th and Friday September 8th. The principal speakers will be F. Almgren (Princeton) who will speak on "Supercomputers and Minimal Surfaces", S.K. Donaldson (Oxford), who will speak on "Yang-Mills Theory and Four-Manifolds", and J. Lewis (DIAS). Contributed short talks are also invited. Overnight accommodation is available in Maynooth at a modest cost, and a dinner will be arranged for Thursday evening if sufficiently many participants are interested. Further details can be had from A. G. O'Farrell, Mathematics Department, Maynooth College, Co. Kildare.

International Mathematical Olympiad

Following the excellent performance last year in Sydney by the first Irish team to participate in the International Mathematical Olympiad, preparations are now being made to send a team to this year's Olympiad, which will be held in Braunschweig.

Our readers might care to pit their wits against the 1988 questions. There were four and a half hours allowed for each paper. Five competitors obtained full marks.

First Paper

1. Consider two concentric circles of radii R and r ($R > r$) with centre O . Fix P on the small circle and consider the variable chord PA of the small circle. Points B and C lie on the large circle, BPC are collinear and BC is perpendicular to AP .
 - (i) For what value(s) of $\angle OPA$ is the sum $BC^2 + CA^2 + AB^2$ extremal?
 - (ii) What are the possible positions of the midpoint U of BA and V of AC as $\angle OPA$ varies?
2. Let n be an even positive integer. Let B be a set and let A_1, A_2, \dots, A_{n+1} be subsets of B such that
 - (i) each A_i has n elements,
 - (ii) each intersection $A_i \cap A_j$ ($i \neq j$) has exactly one element,
 - (iii) every element of B belongs to at least two of the A_i .
 For which n can one assign to every element of B one of the numbers 0 and 1 in such a manner that each A_i has exactly $n/2$ of its elements assigned the value 0?
3. A function f defined on the positive integers (and taking positive integer values) is given by:

$$f(1) = 1, \quad f(3) = 3,$$

$$f(2n) = f(n),$$

$$f(4n+1) = 2f(2n+1) - f(n),$$

$$f(4n+3) = 3f(2n+1) - 2f(n),$$

for all positive integers n . Determine with proof the number of positive integers $n \leq 1988$ for which $f(n) = n$.

Second Paper

4. Show that the solution set of the inequality

$$\sum_{k=1}^{70} \frac{k}{x-k} \geq \frac{5}{4}$$

is a union of disjoint intervals, the sum of whose lengths is 1988.

5. In a right-angled triangle ABC let AD be the altitude drawn to the hypotenuse and let the straight line joining the incentres of the triangles ABD , ACD intersect the sides AB , AC at the points K , L respectively. If E and E_1 denote the areas of the triangles ABC and AKL respectively, show that $E/E_1 \geq 2$.
6. Let a , b be two positive integers such that $ab + 1$ divides $a^2 + b^2$. Prove that $(a^2 + b^2)/(ab + 1)$ is a perfect square.

Each participating country was invited to submit five questions for consideration for use in the contest. The jury then selected the six questions from this pool. Ireland was honoured to have one of its questions, number 4, composed by Finbarr Holland, selected for the contest.

We wish every success to the Irish team this year.

James Callagy (1908–1988)

Jim Callagy was a distinguished member of the Irish mathematical community. He grew up in Galway City where he was a pupil at St. Joseph's Secondary School. His early mathematical career is closely associated to that of his life-long friend, Martin Newell, who later became Professor of Mathematics at University College, Galway and then President of the College. In 1930, Jim and Martin Newell graduated with honours degrees in Mathematics from University College, Galway, after highly distinguished undergraduate careers, during which they closely rivalled each other in academic achievement and participation in the student life of the College. The two of them produced a student magazine, and it will be interesting to those who remember Jim's light, neat figure that he was secretary of the College rugby football club. Another intriguing fact that survives from that period is the result of the first year Arts examination in Jim's first year in College. First overall, a young woman from Rosmuc, second James Callagy and third Martin Newell. It would be interesting to know the identity and subsequent career of the top scholar.

In 1930, Jim went to St. Muireadach's College in Ballina, where he taught until 1934. In 1934, he married and he and his wife Lilly went to live in Listowel, where Jim taught Mathematics at St. Michael's College until 1950. That year, Jim and Lilly returned to Galway and Jim joined the famous Preparatory College of St. Enda's.

St. Enda's was then at its height and, as teacher of honours Mathematics, Jim played a key role among a list of impressive and endearing figures, such as Aodh Mac Dhubhain, Tomás Ó Loideáin, Tomás Ó Sé and Micheál Mac Gabhna, all of them outstanding teachers and individuals who dedicated themselves with enthusiasm and imagination to excellence in education through the Irish language. He lived through the years of hope and excitement, and eventually knew the sorrow of what has since been recognised as a signal blow to the cause of the Irish language, when the country seemed to flinch from the prospect of a possible success of the revival of Irish. The Preparatory Colleges were abolished and Enda's was turned into a staid and conventional secondary A school, which quickly followed the fate of other A schools throughout the country. This transition was undoubtedly a traumatic one for Jim as it was for the other teachers who shared his ideals.

When Jim retired from St. Enda's in 1973, he had taught Mathematics at secondary level for 43 years. During all these years, he had been a meticulous and dedicated teacher and his success both on the academic and the personal level is demonstrated by the enormous number of past pupils of his who achieved success and distinction, and at the same time remained staunch friends of his in later years. His years of teaching however, had been, by his own account, arduous and often frustrating. Then, on retirement, life suddenly accorded him an opportunity which, had it arisen earlier, might perhaps have spared him much frustration and permitted greater personal fulfilment. Over the years, in spite of his dedication to his teaching and his devoted commitment to his wife and family, Jim had found time to pursue his passion for Mathematics and the history of Mathematics. It was this expertise that now afforded him the opportunity of a new career. In 1973, he joined the Mathematics Department at University College, Galway.

His years at U.C.G. were very successful and, again by his own account, very happy. He taught several existing courses in English and Irish and developed a new and highly popular course in the history of Mathematics which is on the curriculum ever since. He found the atmosphere in U.C.G. congenial and instantly developed the closest rapport with his colleagues within the Mathematics Department and outside it. He had always been a man of great charm and erudition. These qualities made him extremely popular among colleagues, many of whom were much younger than him. His meticulously and elegantly dressed figure was well loved in College and his company and conversation were always sought after.

His long and distinguished career in Irish education made Jim well known to a large number of people in this country, but he was also well-liked and respected abroad. For years, he was a regular and important participant in the Summer School of International Post University Courses in Belgium, and the President of the Post University Courses and Honorary Rector of the State University of Ghent, Professor A. Cottenie, was a personal friend of his.

An Irish colleague of Jim's who accompanied him to one of the meetings of the Summer Schools was charmed at the warmth and regard with which Jim was greeted by the other participants. On that occasion, Jim was welcomed as the senior member of a very small number of participants who had attended the Summer School every year over a period of twenty years, and was called upon to deliver an appreciation of the occasion. Characteristically, he did so with accomplished elegance and humour.

The memory that Jim Callagy leaves behind him is a very fond one and a poignant one. His great knowledge of local people and history and their points of contact with world events and European culture were fascinating. His loss inevitably provokes thoughts on the nature and deficiencies of the transmission of knowledge and cultural continuity.

Jim's long career was intimately linked to the Irish educational system, with all its contrasts and conflicting qualities. The constant demands on him by this system, over a period of half a century, could be challenging and exciting but also sometimes capricious and unimaginative. Throughout his life, Jim responded with impeccable professionalism, contributing handsomely to the best the system could offer and struggling bravely against its shortcomings and frustrations. Ultimately, a product of it himself, he was an example of the best that it is capable of.

Tony Christofides

IMS MEMBERSHIP

Ordinary Membership

Ordinary Membership of the Irish Mathematical Society is open to all persons interested in the activities of the Society. Application forms are available from the Treasurer and from Local Representatives. Special reciprocity rates apply to members of the Irish Mathematics Teachers Association and of the American Mathematical Society.

Institutional Membership

Institutional Membership is a valuable support to the Society. Institutional members receive two copies of each issue of the Bulletin and may nominate up to five students for free membership.

Subscriptions Rates

The rates are listed below. The membership year runs from 1st October to 30th September. Members should make payments by the end of January either direct to the Treasurer or through Local Representatives. Members whose subscriptions are more than eighteen months in arrears are deemed to have resigned from the Society.

Ordinary Members	IR£5
IMS-IMTA Combined	IR£6.50
Reciprocity Members from IMTA	IR £1.50
Reciprocity Members from AMS	US\$6
Institutional Members	IR£35

Note: Equivalent amounts in foreign currency will also be accepted.

ARTICLES

Group Presentations, Topology and Graphs

Timothy Porter

A few years ago John McDermott wrote a short article [1] for the Newsletter, as it was then called. This article takes up the relationship studied briefly in his article and looks at several other uses of simple graph-theoretic ideas in the study of group presentations. The level of graph theory involved is not much deeper than that used in his article. The material is used quite successfully in both a three year course in Knot Theory and in an M.Sc. course in algebra at U.C.N.W., Bangor.

1 Group Presentations

As examples of group presentations, we will use a few very simple ones such as:

C_6 , the cyclic group of order 6, having an obvious presentation $(a : a^6)$, but also another slightly more subtle one, $(x, y : x^2, y^3, [x, y])$. D_3 , the dihedral group of order 6, with a presentation $(a, b : a^3, b^2, (ab)^2)$.

In each case we specify a set of generators and some relations between them. To be slightly more precise, we recall:

$$X \subset G \text{ generates } G \text{ if } X \subset H \leq G \text{ implies } H = G$$

i.e., if there is no proper subgroup of G containing X . In this case every $g \in G$ can be written nonuniquely as a word in elements from $X \cup X^{-1}$.

The relations in the presentation are there to handle the *problem of nonuniqueness of representative words*. This is simply illustrated by the following example.

In C_6 , $X = \{a\}$, $a^6 = a.a.a.a.a.a$, and $a^2 = a.a$ representing the same element. This makes it awkward to talk about the relationships between