

Conclusion.

The programme suggested is what is needed and will train *both* mathematicians and computer scientists for worthwhile careers. It will also satisfy the needs of industry and the commercial world.

Both subjects have much to learn from one another. The debate will continue!

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THE IRISH INTERVARSITY COMPETITION IN MATHEMATICS

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What, in your opinion, is the next term in the sequence
3, 5, 1, 15, 11, 10?

This will be a cinch. Easy one to start with. Thanks, Des. Knew he was a good sort.

Let's see. Probably squares minus 1 ... that will explain the 15, anyway. No, doesn't seem to be that. Maybe it's not quite as simple as I thought ...

The Irish Intervarsity in Mathematics came out of the fertile brain of Des MacHale. It was a natural extension of the Super-brain Competition that Des has been running in UCC since 1984. (The question above was the opening problem in the 1987 Super-brain paper.)

I've got it! Should have thought of that earlier. It's obvious. Just a common-or-garden code, 1 for A, 2 for B, and so on. Let's see... CEAOKJ... What language is this? Maybe the Viking name for Cork? Well, it was worth a try, anyway.

The Intervarsity was first held in Cork, in 1990. It moved to TCD for the next 2 years; and UCG hosted the event this year.

The competition was won by TCD in 1990 and 1991, and by UCC in 1992 and 1993. (UCC and UCD tied in 1993; but the prize went to UCC for the best individual result.)

Although the competition is mainly a team event, there is also an individual winner each year. Paul Harrington of TCD won in 1990; Aiden O'Reilly of Maynooth in 1991; Cian Dorr of UCC in 1992; and Peter Hegarty of UCC in 1993.

Maybe it's the number of steps on the stairs in the UCC Maths Dept ... Cork bus numbers ... The ages of Des MacHale's children, in alphabetical order ... The number of moons of the planets ... The winners of the Eurovision Song Contest ...

I've always suspected that man MacHale had a sadistic streak. Now calm down. I've only taken 20 minutes on this question so far. If he's a sadist, we must all be mathematical masochists to sit here and take this sort of thing from him. Everyone else seems to be scribbling away. Even that awful ass from UCD. What was it Tartakower said, "Why am I always being beaten by fools?"

Come on, pull yourself together. Only 25 minutes gone. Let's abandon this question. But now I've invested so much time in it. I know it must really be simple.

The universities in Northern Ireland are invited each year, and were expected in 1991, but didn't materialize. It would be nice to make a special effort to persuade them to take part next year. Perhaps with a promise of a meeting in Queens' the following year?

Women are also conspicuous by their absence. I think there were 2 in Maynooth's team last year, and that was about it. I wonder why? In TCD the students organize a selection test (which Richard Timoney and I usually set) but very few women will take part, even though they constitute some 30% of our student numbers (in maths). In 1991 Helen Joyce—who was our best student for some years as far as exam results are concerned (she went on to get a distinction in Cambridge Part III)—absolutely refused, even under extreme pressure.

I've got it! Not the letters themselves, but the numbers of letters in the words. A well-known saying, with 5 letters in the first word, 3 in the second, and so on. Well, what has 15 letters? Intersarsity? Not quite. Differentiation? Maybe.

I wonder if Kraft-Ebbing had a category for people like MacHale. Does he belong to a recognizable criminal type? Don't you see the similarity between his features and those of Hannibal Lector?

The questions in the Intersarsity were set by Des MacHale in

the inaugural year 1990, and again this year. Richard Timoney and I set the paper in the 2 intervening years.

What sort of questions do we set? Well, without saying this on oath, they shouldn't require much if anything beyond Leaving Certificate standard. And though they shouldn't be too predictable, there are certain recognizable families of problems, or perhaps one should say, families of solutions.

First, there are the problems involving moduli. There was a nice one of these in the 1987 Superbrain:
Is $314154314155314156314157314158314159$ a prime?

So that must be it! At last. Fancy taking all that time to hit on it. It's just a calculation modulo n , for some n . Probably just multiplication by a , for some a . So that's it ... just have to work out n and a . I suppose n must be 16, since the largest number is 15. And a is ... Damn, I was sure I had it.

Then there are the infinite series to be summed. Here there seem to be 2 common themes: firstly, differentiating power-series and substituting (usually $x = 1$); secondly, expressing the n th term $a(n)$ in the form

$$a(n) = b(n+1) - b(n),$$

where $b(n) \rightarrow 0$, so that $\sum_1^{\infty} a(n) = b(1)$. I rather liked a variant of this I hadn't met before, using the relation

$$\tan^{-1} a - \tan^{-1} b = \tan^{-1} \frac{a-b}{1+ab},$$

which is just another way of saying

$$\tan(\theta - \phi) = \frac{\tan \theta - \tan \phi}{1 + \tan \theta \tan \phi}.$$

A pretty example of this is the sum

$$\sum_1^{\infty} \tan^{-1} \frac{1}{2n^2}.$$



Another is

$$\sum_1^{\infty} \tan^{-1} \frac{1}{n^2 + n + 1}.$$

A series surprisingly susceptible to the same difference technique is:

$$\sum_1^{\infty} \frac{2^n}{2^{2^n} + 1}.$$

What do you mean, ten minutes more? Oh my God, my watch has stopped. Wait a moment. Inspiration, where are you? I never liked that man MacHale. Did you notice his eyebrows? The crime rate has rocketed since he started his Superbrain. Surely parents don't expect their children to be subjected to this kind of thing when they send them to college.

Then there are the 'sporadic' questions—once-off, never seen before and never to be seen again. There was one like that in the 1990 Intervarsity: Find any solution in positive integers of

$$x^x y^y = z^z.$$

The School of Maths in TCD ground to a halt for a week, as we all looked for solutions; and I noticed the mathematicians from UCD looking very tired and emotional at that time.

What do you mean, is that all I've written? I've got better things to do than sit around all day answering silly questions. I'm going for a drink. You see what that man has done to me, I never drink at this time of day.

OK, it must have been easy. Shall I ask that nasty type sitting in front of me, who spent the entire time scribbling. No. It would be too shaming. There are some things it is better not to know.

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