A6770 Sidn Redelmeier Emails ald to several

From redvax!hugh Tue Jul 16 20:29:59 EDT 1991 Received: by gauss; Wed Jul 17 06:44:23 EDT 1991 Received: by inet.att.com; Wed Jul 17 06:44 EDT 1991 Received: by redvax (4.0/SMI-4.0)

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From: redvax!hugh ("D. Hugh Redelmeier")
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To: utzoo!research.att.com!njas

Status: R

| I don't think the 2 things conflict! And I do have sequences | of the number of different polyominoes of various kinds worked out

| by Lunnon, Klarner et al, all from over 15 years ago.

Another reference you should look at is:

M.F.Sykes and Maureen Glen:

Percolation processes in two dimensions I. Low-density series expansion.

J. Phys. A. Math. Gen. Vol 9 No 1 (1976) pp 87-95

There may well be others that I am unaware of or have forgotten.

My enumerations are for "fixed" polyominoes (other than the square cell results). This is because it is easier -- it takes a fair bit of analysis and programming to generate the symmetric counts that I use to figure out the "free" counts from the "fixed". The second reason is that my consumers, the physicists, seem to only care about the fixed results. The figures you sent me appear to be free counts.

Here, for example, are my fixed counts for cubic-celled polyominoes up to size 16. Warning: I haven't looked at this for five years so I may have botched something in grabbing them. No referee has checked my work.

1931

This computation took about a week on a machine equivalent to an ordinary IBM PC-AT. Another term might take a day of time on a RISC workstation.

As a sanity check, I just took the ratio of Lunnon's 12 free numbers (from your message) with mine. It should approach from below the number of fixed polyominoes that correspond to a single asymmetric free polyomino (for square-celled ones, this is 8). For these

cubic-cell counts, it seems to converge nicely to 24. Is that the right number?

```
1.00000000

3.00000000

7.50000000

10.75000000

18.41379310

20.96987951

22.97360703

23.53553886

23.86350934

23.93566743

23.98129726

23.99159375
```

Fixed hexagonal cell polyominoes up to size 19:

```
1
3
11
44
186
814
3652
16689
77359
362671
1716033
8182213
39267086
189492795
918837374
4474080844
21866153748
107217298977
527266673134
```

The ratios of these and Lunnon's results seem to converge to 12.

Fixed triangular cell polyominoes up to size 27:

\$2

I also enumerated polyominoes with square cells where corners (as well as edges) touching count as a connection. This appears to be of interest to physicists. Here are the fixed counts up to size 16.

I calculated the "perimeter polynomials" for these various kinds of polyominoes (as explained in Sykes and Glen). Are these of interest to you?

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