1349 = N649
3216
→ 88

[PL2 4. 265. 73]

Fortran IV for an IBM 360/65. It produced all 48 H-flats of 6 points in about 3 seconds. For the 383 H-flats of 7 points, the run time was about 6 minutes. Although many shortcuts could have been employed from the information thus far gathered, it was decided, perhaps unwisely, to just "grind out" the H-flats for 8 points. Since it was obvious that a single run would not suffice, a restart procedure was added to the program. The total run time for the 1020 H-flats of 8 points was slightly over 10 hours! One graph of 21 lines had 4880 ALIASes!

Number of Hamiltonian Graphs

Table 1 presents the number of graphs of p points and q lines, for p equal to 6, 7, and 8. The body of the table indicates the total number of unique graphs, separated into connected and disconnected. A column indicates, for each q, the number of connected graphs that are Hamiltonian.

Harary's excellent book on graph theory (3) contains a table (p. 214) displaying the number of graphs of $p \leq 9$; but the column totals for p8 and p9 are in error, although the numbers for each q are apparently correct. The total number of graphs for p8 should be 12,346 and for p9 should be 274,668. ✓ (have)

Cadogan (4), using the Möbius Function, presented a table of the number of connected graphs for $p \leq 9$. (In his table, p8, q11 should be 814, not 813.) Also, a little-known report by Osterweil (5), who enumerated non-separable graphs on fewer than ten points, presented the number of connected graphs through eleven points:

p9	261,080
p10	12,005,368
p11	1,018,997,864

N649 = 1349 ✓

91

3216

H = Hamiltonian graphs

3216 = N1111.5

The Number of Graphs of p points and q lines

q	p = 6				p = 7				p = 8			
	d	c	H	t	d	c	H	t	d	c	H	t
0	1			1	1			1	1			1
1	1			1	1			1	1			1
2	2			2	2			2	2			2
3	5			5	5			5	5			5
4	9			9	10			10	11			11
5	9	6		15	21			21	24			24
6	8	13	1	21	30	11		41	56			56
7	5	19	2	24	32	33	1	65	92	23		115
8	2	22	6	24	30	67	2	97	132	89	1	221
9	1	20	11	21	24	107	10	131	166	236	3	402
10	1	14	11	15	16	132	30	148	177	486	19	663
11		9	3	9	10	138	58	148	166	814	82	980
12		5	5	5	5	126	77	131	143	1169	256	1312
13		2	2	2	2	95	73	97	103	1454	553	1557
14		1	1	1	1	64	56	65	67	1579	975	1646
15		1	1	1	1	40	37	41	42	1515	1068	1557
16						21	20	21	22	1290	1045	1312
17						10	10	10	10	970	824	980
18						5	5	5	5	658	546	663
19						2	2	2	2	400	335	402
20						1	1	1	1	220	204	221
21						1	1	1	1	114	110	115
22										56	55	56
23										24	24	24
24										11	11	11
25										5	5	5
26										2	2	2
27										1	1	1
28										1	1	1
	44	112	48	156	191	853	383	1044	1229	11117	6020	12346

d = disconnected graphs
c = connected graphs
H = Hamiltonaian graphs
t = total graphs

Table 1

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