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DPMMS, 16 Mill Lane, Cambridge CB2 1SB.
(only if letters arrive by 75:viii:1)

f91

6261

Dear Neil,

I will be back in Calgary on 75:viii:4. I have just written to you, thanking you for offprints, but that was via my secretary, so this will probably reach you sooner. I am preparing a lecture on "the unity of combinatorics" to give in York on Wed, and looked at "A piece of cake" which I may already have written to you about. I expect you know the one about the cake with n points on the boundary, with a straight cut from each point to every other; no 3 cuts through a point. How many pieces? for $n = 1,2,3,4,5$ it is 1,2,4,8,16. No prize for giving the next term. A bit surprising that it is the same number as the # of regions that 4-space is divided by $n-1$ hyperplanes in general position. I have a nice combinatorial argument (I think!) showing that the # is $\binom{k}{0}+\binom{k}{1}+\binom{k}{2}+\binom{k}{3}+\binom{k}{4}$ where $k = n-1$. To cut a long cake short, here is an array (yet another that I would like to see in your book) with ref. to Sloane:

#1611
#1428

# of dimensions \ # of hyperplanes	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d=0	1	(1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
d=1 #173 →	1	2	3	(4)	(5)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
d=2 #391 ⇒	1	2	4	7	11	(16)	(22)	29	37	46	56	67	79	92	106	121	137	154	172	191	211	232	254 !!
d=3 #419 →	1	2	4	8	15	26	42	(64)	(93)	130	176	232	299	378	470	576	697	834	988	1160	1351	1562	1794 2048
d=4 #427 →	1	2	4	8	16	31	57	99	163	(256)	(386)	562	794	1093	1471	1941	2517	3214	4048	5036	6196	7547	9109 10903
d=5 6261 →	1	2	4	8	16	32	63	120	219	382	638	(1024)	(1586)	2380	3473	4944	6885	9402	12616	16664	21700	27896	35443 44552
d=6	1	2	4	8	16	64	127	247	466	848	1486	2510	(4096)	(6476)	9949	14893	21778	31180	43796	60460	82160	110056	145499
d=7	1	2	4	8		128	255	502	968	1816	3302	5812	9908	(16384)	(26333)	41226	63004	94184	137980	198440	280600	390656	
d=8	1	2	4	8		256	511	1013	1981	3797	7099	12911	22819	39203	(65536)	(106762)	169766	263950	401930	600370	880970		
	1	2	4	8		512	1023	2036	4017	7814	14913	27824	50643	89846	155382	(262144)	(431910)	695860	1097790	1698160			
	1	2	4	8		1024	2047	4083	8100	15914	30827	58651	109294	199140	354522	616666	(1048576)	(1744436)	2842206				
	1	2	4	8		2048	4095	8178	16278	32192	63019	121670	230964	430104	784626	1401292	2449868	(4194304)					
	1	2	4	8		4096	8191	16369	32647	64839	127858	249528	480492	910596	1695222	3096514	5546382						
	1	2	4	8		8192	16383	32752	65399	130238	258096	507624	~~480492~~	~~910596~~	3593934	6690448							
													988116	1898712									

power of 2

#432 #1059 #1382 #1585 #1725 #1851

This is all rather obvious, they are just sums of binomial coefficients, but I wanted to point out the following (probably known to you already; I only have the book with me, not the supplement):

(a) #1611 continues, after 431910, with 1744436, 7036530, 28354132, 114159428, 459312152, ... and presumably has a simpler description, or at least recurrence. ✓

(b) #1585 also has a simpler description (I will check monatsh. tomorrow) and continues, after 1981, 4017, 8100, 16278, 32647, 65399, 130918, 261972, 524097, 1048365, 2096920, 4194050, 8388331, 16776915, 33554106, 67108512, 134217349, 268435049, 536870476, 1073741358, ... ✓

(c) #1725 continues, after 1816, 3797, 7814, 15914, 32192, 64839, 130238, 261156, 523128, 1047225, 2095590, 4192510, 8386560, 16774891, 33551806, 67105912, 134214424, 268431773, 536866822, 1073737298, ... ✓

(d) #1851 has last entry misprinted, should be 1486, continues 3302, 7099, 14913, 30827, 63019, 127858, 258096, 519252, 1042380, 2091605, 4185195, 8377705, 16764265, 33539156, 67090962, 134196874, 268411298, 536843071, 1073709893, ... ✓

(e) to suggest you might put in some more rows and diagonals of this array, with their formulae, mostly 2^n ..... as in #1382, the Eulerian #s. A coining theorist might have gone as far as 1, 22, 254, 2048, 12951, 68406, 313912, 1285624, 4791323, 16489546, 53009102, ... ?

Best wishes,

Yrs sincerely,

Richard.

A346, A302, A27, A124, A125, A127, A6261, A79, A225, A295, A2662, A2663, A2664