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K. McKeon

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July 25, 1991

5 of 4
Indexed

Sent her email 4/28/94

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Neil Sloane
Room 2C-376
ATT Bell Labs
Murray Hill, NJ 07974

Dear Dr. Sloane:

I am familiar with your book *Handbook of Integer Sequences* and am pleased that you are interested in including my sequences which appeared in the article "The expected number of symmetries in locally-restricted trees I" (Alavi et al 1991). As you requested, I have enclosed the initial terms for the two sequences which appeared in that article along with a copy of the article. I have also included the corresponding pairs of sequences $\{S_n\}$ and $\{s_n\}$ for the other types of trees (3-trees, 4-trees and (1,4)-trees) which were referred to in the article. These other sequences have only appeared in my Ph. D. dissertation.

In addition, I have two other sequences which you may wish to include in your book. These sequences enumerate rooted and free highly irregular trees. A highly irregular graph is a connected graph in which each vertex is adjacent only to vertices with distinct degrees. This definition was made by Alavi, Chartrand, Chung, Erdos, Graham and Oellermann in a paper, "Highly Irregular Graphs" that appeared in the *Journal of Graph Theory* in 1987. I have enumerated highly irregular trees and am currently writing up the results in a paper which I will send to you when it is completed, if you are interested.

Sincerely,

Kathleen A. McKeon

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Table 2. Coefficients of T(x,2) and t(x,2) for (1,3)-trees.

n	A3609 S_n	A3610 s_n
4	10	8
5	14	56
6	42	24
7	90	168
8	354	240
9	758	608
10	2290	920
11	6002	5680
12	18410	6104
13	51310	18416
14	154106	43008
15	449322	148152
16	1384962	325608
17	4089174	980840
18	12475362	2421096
19	37746786	7336488
20	116037642	19769312
21	355367310	58192608
22	1097869386	164776248
23	3393063162	502085760
24	10546081122	1427051544
25	32810171382	4261678656
26	102465452754	12615722288
27	320522209490	37914214232
28	1005428474218	113567513528
29	3159128678510	343641240328
30	9947763312410	1039134670952
31	31374858270154	3164525151512
32	99133809899138	9638997662848
33	313680433887702	29494412007120
34	994070600867778	90400450050120
35	3154447132624578	278010905513408

S_n = total number of symmetries in planted (1,3)-trees on 2n vertices

Initial values: $S_1 = 1$, $S_2 = 2$, $S_3 = 2$, $S_4 = 10$

s_n = total number of symmetries in free (1,3)-trees on 2n vertices

Initial values: $s_1 = 2$, $s_2 = 6$, $s_3 = 8$, $s_4 = 8$

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Table 4. Coefficients of T(x,2) and t(x,2) for 3-trees.

n	S_n A3611	s_n A3612
4	4	8
5	9	4
6	16	14
7	41	21
8	78	35
9	179	49
10	382	158
11	889	191
12	1992	425
13	4648	828
14	10749	1864
15	25462	3659
16	59891	8324
17	142793	17344
18	340761	39601
19	819533	87407
20	1975109	199984
21	4784055	453361
22	11617982	1053816
23	28316757	2426228
24	69185852	5672389
25	169516558	13270695
26	416268547	31277150
27	1024543728	73874375
28	2526631078	175419550
29	6242969248	417535487
30	15452300967	997758788
31	38310417739	2390172398
32	95126958081	5743235470
33	236548880263	13832781125
34	589014148511	33401381861
35	1468545756633	80825852570

S_n = total number of symmetries in planted 3-trees on n+1 vertices
Initial values: $S_1 = 1$, $S_2 = 1$, $S_3 = 3$

s_n = total number of symmetries in free 3-trees on n vertices

Initial values: $s_1 = 1$, $s_2 = 2$, $s_3 = 2$.

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Table 6. Coefficients of T(x,2) and t(x,2) for (1,4)-trees.

n	A3613 S_n	A3614 s_n
4	96	144
5	1560	1584
6	4848	32544
7	28848	30528
8	248352	188928
9	1446240	4030848
10	12905664	12029184
11	99071040	66104064
12	649236480	524719872
13	4924099200	2364433920
14	49007023872	28794737664
15	304778309376	194617138176
16	2301818168832	962354727936
17	18389782387200	6901447938048
18	138110895596544	11206123488460 8
19	1094304243348480	366020989931520
20	8691945066848256	2592919032274944
21	68039592521668608	19913392024584192
22	541189487303208960	140498248288886784

S_n = total number of symmetries in planted (1,4) trees on 3n-1 vertices

Initial values: $S_1 = 1$, $S_2 = 6$, $S_3 = 12$

s_n = total number of symmetries in free (1,4) trees on 3n-1 vertices

Initial values: $s_1 = 2$, $s_2 = 24$, $s_3 = 72$

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Table 8. Coefficients of T(x,2) and t(x,2) for 4-trees.

	A3615	A3616
n	S_n	s_n
4	10	8
5	17	28
6	38	20
7	106	43
8	253	143
9	716	249
10	1903	546
11	5053	1223
12	13786	2703
13	39293	8107
14	107641	18085
15	302807	44013
16	860099	114919
17	2450684	327712
18	7038472	800937
19	20316895	2146066
20	58849665	5827711
21	171217429	15923828
22	499926666	43886143
23	1464276207	121888966
24	4301706250	340209504
25	12671810107	955859391
26	37419912977	2700771322
27	110759884262	7652412896
28	328525197554	21784431688
29	976350258323	62248194140
30	2906960957827	178463482459

S_n = total number of symmetries in planted 4-trees on n+1 vertices

Initial values: $S_1 = 1$, $S_2 = 1$, $S_3 = 3$

s_n = total number of symmetries in free 4-trees on n vertices

Initial values: $s_1 = 1$, $s_2 = 2$, $s_3 = 2$

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The number of rooted and free highly irregular trees

H_n - the number of rooted highly irregular trees on n vertices

h_n - the number of free highly irregular trees on n vertices

n	H_n	h_n
1	1	1
2	1	1
3	0	0
4	2	1
5	0	0
6	0	0
7	0	0
8	4	1
9	9	1
10	5	1
11	0	0
12	0	0
13	0	0
14	7	1
15	15	1
16	16	2
17	34	2
18	72	5
19	133	7
20	250	14
21	399	19
22	572	28
23	828	36
24	1176	51
25	1700	68
26	2509	99
27	3456	128
28	4494	164
29	5887	203
30	7980	272
31	11625	375
32	18064	576
33	28710	870
34	46665	1392
35	77070	2202
36	127187	3564
37	209300	5657
38	341674	9038
39	550078	14105
40	873272	21899

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