

an

3116
etc

H P Robinson

letter &
attachments

Nov 13 1973

Entd

3116
2945-
3117
3118

HERMAN P. ROBINSON

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13 November 1973

→ 3105
39924

Dr. Neil J.A. Sloane
Bell Laboratories
600 Mountain Avenue
Murray Hill, NJ 07974

Dear Neil:

Thank you for the information on ALTRAN. I wish I had had it when I prepared Table IV in UCRL-20418. It would have saved a lot of time. How many coefficients will the program handle? Does it provide for all the common expressions likely to be needed, or do you enter separate information whenever one is needed, for example $e^{\sin x}$?

I am sending you the first 448 coefficients in the expansion of Lehmer's matrix

$$F(x) = \begin{vmatrix} 1 & \sqrt{x} & 0 & \dots \\ \sqrt{x} & 1 & x & \dots \\ 0 & x & 1 & x^2 \\ \vdots & \vdots & \vdots & \ddots \end{vmatrix} = 1 - x - x^2 - x^3 + x^6 + x^7 + 2x^8 \dots$$

39924 → 3116

where x equals the former q^2 . I took the reciprocal of this to get the coefficients 1, 1, 2, 4, 7, 13, 23, 41, 74, ... and Lehmer was interested and says they will probably increase indefinitely, with no change in sign. He obtained the next one, but it gets tedious. We wondered if ALTRAN, which Lehmer knows about but does not have at Berkeley, could get some more for us? Don't bother if it is any trouble. The alternate terms 1, 4, 13, 41, are your sequence 1409. but the next term misses, unfortunately. (127)

Lehmer also found for the expansion of the matrix an interpretation of the coefficients as differences of certain partitions. I can't really follow it.

For some reason I checked one of the continued fraction sequences in your Supplement, then decided to check some more and extend them, and finally added another three. The results are enclosed and check those in the Supplement.

Sincerely,

Herman

7 meaning / it

11 of C_{2n}

	0	1	2	3	4
0	1	-1	-1	-1	-0
1	2	1	2	1	1
2	-1	-3	-3	-4	-3 <small>1.078</small>
3	-2	-3	-0	-1	3
4	9	7	11	9 ^{3²}	13
5	12	7	9	3	5
6	-7	-17	-15	-24 ^{3³}	-21
7	-31	-40	-33 <small>3⁴ 51</small>	-41	-31
8	-18	-24	-6	-11	9 ^{3²}
9	48	42	67	62	88 ^{3³ 11}
10	122	108	132	114	138 <small>4.925</small>
11	124	88	104	62	76
12	-5	-67	-59	-123	-114
13	-232	-307	-289	-363	-337
14	-405	-473	-417 <small>6.0</small>	-479	-409
15	-327	-370	-253	-286	-151
16	120	102	284	270	466
17	854	827	1046	1010	1232
18	1541	1443	1647	1521	1715
19	1691	1450	1587	1306	1420
20	876	450	496	28	58
21	-994	-1589	-1586	-2213	-2201
22	-3451	-4132	-4049	-4725	-4597
23	-5467	-6086	-5750	-6324	-5890 <small>8.68</small>
24	-5699	-6107	-5331	-5669	-4757
25	-2983	-3106	-1781	-1828	-366
26	3030	3133	4965	5097	7033
27	11381	11452	13575	13578	15724

	5	6	7
	- 0	1	1
	+ 0	+ 0	-2
6+	-5	-3	-4
	2	5	5
	10	13 2,56495	9
	-3	-1	-9
	-31	-27	-37
	-39	-27	-33
	5	26	23
	80	107	96
25	113	134	106
	28	38	-16
	-184	-173	-246
	-412	-379	-449
	-465	-381	-429
	-179	-28	-48
	450	656	638
	1178	1398	1326
	1554	1729 7,45530	1533
	1091	1181	805
	-460	-444	-1000
	-2854	-2833	-3499
	-5265	-5080	-5727
7+	-6422	-5882	-6352
	-5024	-3982	-4169
	-353	1240	1306
	7162	9181	9299
	15623	17754	17528

	0	1	2	3	4
28	19628	19229	21263	20673	22615
29	24193	22802	24298 10,09875	22586	23890
30	21309	18454	19065	15802	16171
31	8366	3821	3478	-1473	-2013
32	-14632	-20688	-21614	-27956	-28904
33	-43985	-50886	-51509	-58452	-58800
34	-72069	-78706	-77695	-84052	-82384
35	-88290	-93340	-89147 46,39604	-93593	-88369
36	-81363	-83648	-74899	-76352	-66309
37	-42616	-41552	-27497	-25613	-10216
38	30343	34268	53332	57748	77866
39	130435	135374	157799	162559	185412
40	239534	242257	265079	266611	288965
41	329456	325631	344963	338772	356582
42	365948 +2,81025	350891	362650	344139	353457
43	315682	285424	286467	251992	250114
44	155480	107923	97283	45425	32079
45	-118033	-181925	-201962	-269314	-290869
46	-480357	-555783	-578914	-655993	-678407
47	-875023	-953305	-969204	-1046427	-1058503
48	-1215844	-1285179	-1280443	-1345454	-1333251
49	-1396690	-1443942	-1403933 +4,15479	-1443684	-1392657
50	-1308961	-1322389	-1234007	-1237585	-1135543
51	-865362	-837858	-692851	-654837	-495247
52	-26628	40928	242717	318964	533777
53	1173471	1269446	1517465	1617344	1873898
54	2610406	2711010	2982839	3079509	3352479
55	4064302	4134143	4396412	4451968	4705648

5

6

7

21788	23607	22517
21814	22900	20452
12479	12596	8482
-7366	-8079	-13793
-35496	-36413	-43182
-65727	-65718	-72536
-88397	-85988	-91548
-92153	-85830	-88878
-66933	-55564	-55334
-7587	9090	12430
82625	103656	108610
189730	212803	216459
288990	310588	308858
347719	363736	351930
331210	337906	311748
211291	206433	163267
-23985	-39859	-99934
-361376	-384000	-457198
-756580	-777612	-856162
1133915	-1141312	-1214074
1393169	-1372597	-1426557
1424261	-1361481	-1384242
1128965	-1012869	-995851
-446986	-272984	-214778
617744	844700	935352
1975926	2239390	2341768
3442762	3714563	3795999
4743981	4986377	5004628

3

41

5

N1677.5
= 2950

N880.5 = 2945
new

N155.5
2946

N74.5 N111.5
= 2947 = 2948

N1294.5
= 2949

CONTINUED FRACTION EXPANSIONS

$2^{1/5}$	$5^{1/5}$	$2^{1/3}$	$3^{1/3}$	$4^{1/3}$	$5^{1/3}$	$6^{1/3}$
1	1	1	1	1	1	1
6	2	3	2	1	1	1
1	1	1	3	1	2	4
2	1	5	1	2	2	2
1	1	1	4	2	4	7
1	2	1	1	1	3	3
1	1	4	5	3	3	508
3	2	1	1	2	1	1
25	8	1	1	3	5	5
1	1	8	6	1	1	5
4	25	1	2	3	1	1
3	1	14	5	1	4	1
3	5	1	8	30	10	1
7	1	10	3	1	17	2
52	22	2	3	4	1	1
1	1	1	4	1	14	1
2	8	4	2	2	1	24
3	1	12	6	9	1	1
2	1	2	4	6	3052	1
15	9	3	4	4	1	1
2	1	2	1	1	1	3
2	1	1	3	1	1	3
4	4	3	2	2	1	30
16	1	4	3	7	1	4
2	2	1	4	2	1	10
7	1	1	1	3	2	158
1	2	2	4	2	2	6
1	1	14	9	1	1	1
1	2	3	1	6	3	1
10	2	12	8	1	2	2
21	1	1	4	1	1	3
1	1	15	3	1	13	2
1	1	3	1	25	5	2
1	1	1	3	1	1	5
15	2	3	2	7	1	1
1	1	1	6	7	1	9
4	6	638	1	1	1	4
3	2	3	167	1	1	1
2	46	2	2	1	4	9
1	1	5	1	1	2	1
1	12		2	126	4	1
1	1		2	1	3	
3	15			1		ent
1	9			1		
1	1			3		ent
1	1			2		
1	2			1		wrong
1	1			26		
31	31			ent		

1
6
2
46
1
12
1
15
9
1
1
2
1
31

entd
entd

entd

wrong

ent
↑
cut

wrong

ent

wrong

ent

wrong

ent

new
3117
=N141.5

new
3118
N1031.8

new omit
CONTINUED FRACTION EXPANSIONS

$3^{1/5}$	$4^{1/5}$	$6^{1/5}$
1	1	1
4	3	2
14	7	3
2	1	8
1	2	4
1	2	2
3	1	2
2	2	1
29	4	4
2	56	2
1	1	1
7	14	14
1	2	5
5	1	3
2	1	1
1	3	1
1	5	2
19	6	22
12	2	1
77	1	1
2	1	15
16	2	2
2	1	1
1	1	1
1	8	114
15	1	1
1	2	1
1	2	12
3	1	2
14	5	6
2	1	24
1	4	
19	1	
1	1	
117	3	
1	3	
1	1	
1	1	
	3	
	7	
	4	
	1	
	3	
	4	
	7	
	1	
	7	
	1	
	2	