Collatz Space and 4N+1 Series Space

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1. Introduction

When Collatz problem[1)] is true, his rule arranges all odd numbers in a space. This space rerates to 4N+1 series showed from the 2^m infinite series (Table 1).

Table 1. 4N+1 series and all odd numbers.

“A_1,	A_2,	A_3,	A_4,	A_5,	・・・・,	A_{n-1},	$A_n= 4*A_{n-1}+1$,	・・・・”
(1), 5,	**21**,	85,	341,	1365,	・・・・・,	${}^{21}A_{n-1}$,	${}^{21}A_n= 4*{}^{21}A_{n-1}+1$,	・・・・
x≅2	0	1	2	0	(mod 3)			
3,	13,	53,	213,	853,	・・・・・,	${}^{3}A_{n-1}$,	${}^{3}A_n= 4*{}^{3}A_{n-1}+1$,	・・・・
x≅0	1	2	0	1	(mod 3)			
7,	29,	**117**,	469,	1877,	・・・・・,	${}^{117}A_{n-1}$,	${}^{117}A_n= 4*{}^{117}A_{n-1}+1$,	・・・・
x≅1	2	0	1	2	(mod 3)			
9.	37,	149,	597,	2389,	・・・・・,	${}^{9}A_{n-1}$,	${}^{9}A_n= 4*{}^{9}A_{n-1}+1$,	・・・・
x≅0	1	2	0	1	(mod 3)			
11,	**45**,	181,	725,	2901,	・・・・・,	${}^{45}A_{n-1}$,	${}^{45}A_n= 4*{}^{45}A_{n-1}+1$,	・・・・
x≅2	0	1	2	0	(mod 3)			
15,	61,	245,	981,	3925,	・・・・・,	${}^{15}A_{n-1}$,	${}^{15}A_n= 4*{}^{15}A_{n-1}+1$,	・・・・
x≅0	1	2	0	1	(mod 3)			
17,	**69**,	277,	1109,	4437,	・・・・・,	${}^{69}A_{n-1}$,	${}^{69}A_n= 4*{}^{69}A_{n-1}+1$,	・・・・
x≅2	0	1	2	0	(mod 3)			
19,	77,	**309**,	1237,	4949,	・・・・・,	${}^{309}A_{n-1}$,	${}^{309}A_n= 4*{}^{309}A_{n-1}+1$,	・・・・
x≅1	2	0	1	2	(mod 3)			
23,	**93**,	373,	1493,	5973,	・・・・・,	${}^{93}A_{n-1}$,	${}^{93}A_n= 4*{}^{93}A_{n-1}+1$,	・・・・
x≅2	0	1	2	0	(mod 3)			
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All odd numbers can be arranged, using all 4N+1 series, in which 1st terms are 1, 3, 8u−1, 8u+1 and 8u+3 (u; natural numbers). 2nd, 3rd, 4th ・・・・・ terms in these series are always 8u+5. In this report, we discuss the space arranging these 4N+1 series.

Each 4N+1 series stands in line "0, 1, 2, 0, 1, 2, 0, 1, 2, ・・・・・ (mod 3)". Each triplet "8u−1, 8u+1 and 8u+3" is "0, 1, 2 (mod 3)". We can operate the unit of { A_p, A_{p+1}, A_{p+2} } (p; natural number) in each series. In this report, we named each series the value of a term x ≙0 (mod 3) in { A_1, A_2, A_3 }.

Then, Collatz foresees "B_0 = 1 at formula (1)".

$$(3*B_n+1)/2^m = B_{n-1} \qquad \text{Formula (1).}$$

B ; Every odd number, m, n ; Natural number.

The 2^m series is standardized at 3 by this formula. We get formula (2), which is equivalent to formula (1).

$$B_n = (2^m*B_{n-1} - 1)/3 \qquad B_{n-1}\text{ ; } x \triangleq 1 \text{ or } 2 \pmod 3 \qquad \text{Formula (2).}$$

When B_{n-1} = 1, we get main series(21-series) using 2^m series (m; even number).

5, 21, 85, 341, 1365, ・・・・, ${}^{21}A_{n-1}$, ${}^{21}A_n = 4*{}^{21}A_{n-1}+1$, ・・・・・

x≙2 0 1 2 0 (mod 3)

" ${}^{21}A_2$ = 21" is the billboard in { ${}^{21}A_1$, ${}^{21}A_2$, ${}^{21}A_3$ }. ${}^{21}A_1$ and ${}^{21}A_3$ in { ${}^{21}A_1$, ${}^{21}A_2$, ${}^{21}A_3$ } can be grafted by Formula (2).

2. Discussion I

We get 1st graft series (Figure 1.), grafting on main series.

Figure 1. 1st graft series on { ${}^{21}A_1$, ${}^{21}A_2$, ${}^{21}A_3$ }.

${}^{21}A_1$=5 x≙2 (mod 3), $B_n = (2^m*5 - 1)/3$, (m; odd).

∴ 3-series; **3**, 13, 53, 213, 853, ・・・・, ${}^{3}A_{n-1}$, ${}^{3}A_n = 4*{}^{3}A_{n-1}+1$, ・・・・

${}^{21}A_2$=21 x≙0 (mod 3), Non-graft.

${}^{21}A_3$=85 x≙1 (mod 3), $B_n = (2^m*85 - 1)/3$, (m; even).

∴ 453-series; 113, **453**, 1813, ・・・・, ${}^{453}A_{n-1}$, ${}^{453}A_n = 4*{}^{453}A_{n-1}+1$, ・・・・

And we get 2nd graft series, grafting on 1st Graft series. And then, we get 3rd graft series, grafting on 2nd Graft series. ································

Then (n)-th graft series is gotten on (n-1)-th graft series.

We classify graft types into a, b and c, according to its shape. As each non-graft term is 3*k (k; odd), new graft series are expressed at Table 2.

Table 2. Graft types

a) $\{ {}^{3p}A_1, {}^{3p}A_2, {}^{3p}A_3 \} = \{x \triangleq 0, 1, 2 \pmod 3\}$ (p; odd number) Formula(3).

$^{t}A_1 = (4*{}^{3p}A_2 - 1)/3 = \{4*(4*{}^{3p}A_1 + 1) - 1\}/3 = 16*{}^{3p}A_1/3 + 1.$

$^{s}A_1 = (2*{}^{3p}A_3 - 1)/3 = [2*\{4*(4*{}^{3p}A_1 + 1) + 1\} - 1]/3 = 2*(16*{}^{3p}A_1/3 + 1) + 1.$

Where $^{s}A_1$ is the center between $^{t}A_1$ and $^{3p}A_3$.

b) $\{ {}^{3q}A_1, {}^{3q}A_2, {}^{3q}A_3 \} = \{x \triangleq 2, 0, 1 \pmod 3\}$ (q; odd number) Formula(4).

$^{s}A_1 = (2*{}^{3q}A_1 - 1)/3 = \{2*({}^{3q}A_2 - 1)/4 - 1\}/3 = ({}^{3q}A_2/3 - 1)/2.$

$^{t}A_1 = (4*{}^{3q}A_3 - 1)/3 = \{4*(4*{}^{3q}A_2 + 1) - 1\}/3 = 16*{}^{3q}A_2/3 + 1.$

c) $\{ {}^{3r}A_1, {}^{3r}A_2, {}^{3r}A_3 \} = \{x \triangleq 1, 2, 0 \pmod 3\}$ (r; odd number) Formula(5).

$^{t}A_1 = (4*{}^{3r}A_1 - 1)/3 = [4*\{({}^{3r}A_3 - 1)/4 - 1\}/4 - 1]/3 = \{({}^{3r}A_3/3 - 1)/2 - 1\}/2.$

$^{s}A_1 = (2*{}^{3r}A_2 - 1)/3 = \{2*({}^{3r}A_3 - 1)/4 - 1\}/3 = ({}^{3r}A_3/3 - 1)/2.$

Where $^{s}A_1$ is the center between $^{t}A_1$ and $^{3r}A_2$.

when $^{t}A_1, {}^{s}A_1$; $x \triangleq 0 \pmod 3$, we named each series the value of A_1.

when $^{t}A_1, {}^{s}A_1$; $x \triangleq 1 \pmod 3$, we named each series the value of $A_3 = 4*(4*A_1 + 1) + 1$.

when $^{t}A_1, {}^{s}A_1$; $x \triangleq 2 \pmod 3$, we named each series the value of $A_2 = 4*A_1 + 1$.

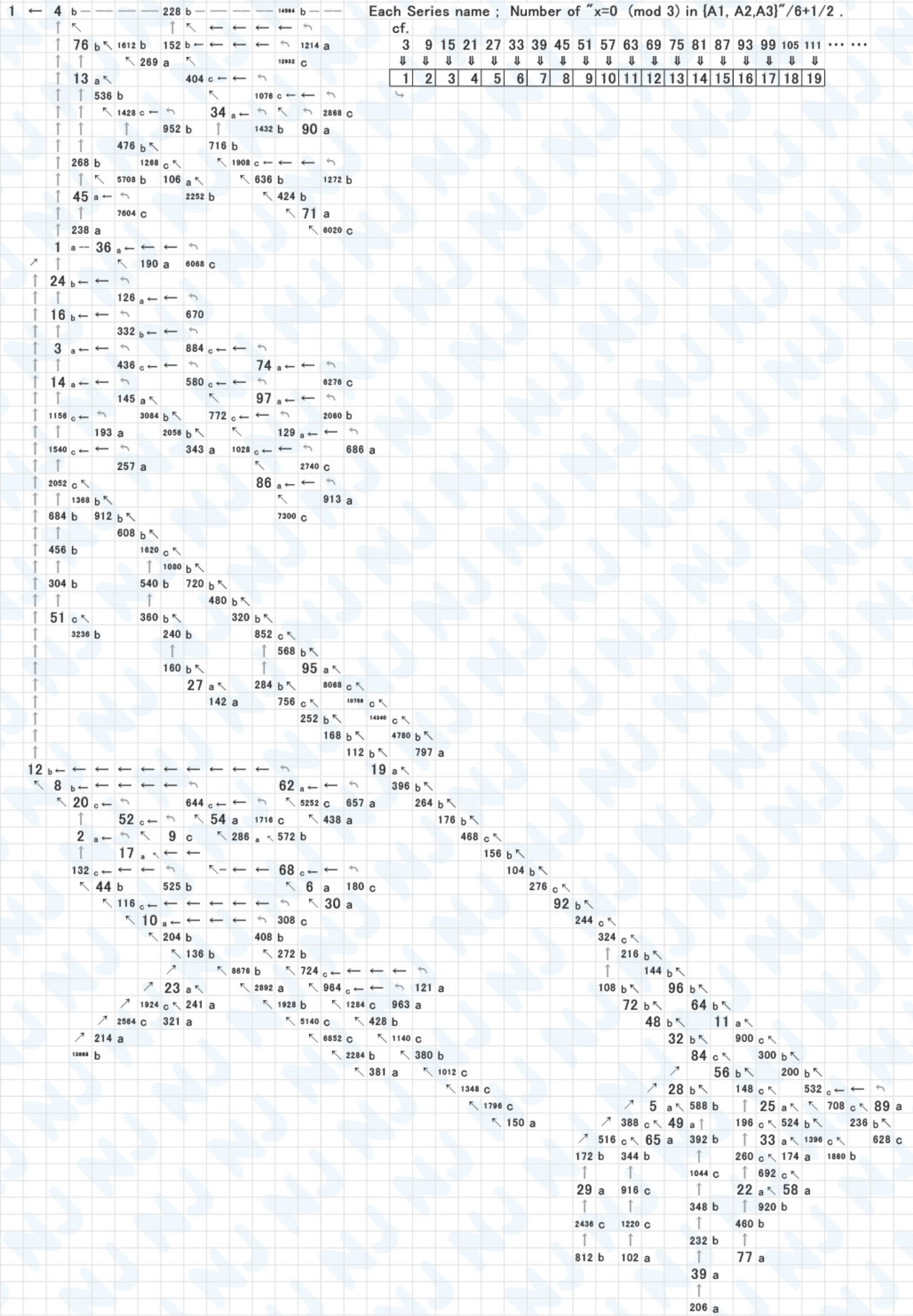
From Table 2, we have a constant stream of new 3*k-series (k; odd). Table 3 expresses many 3*k-series from 1st-graft series to 40th graft series. These 3*k- series increase by 2^n. Therefore, Collatz space continues grafting infinitely for appearing all odd numbers.

Table 3. Graft stracture of $^{3k}An = 4*^{3k}A_{n-1} + 1$ (n; natural number, k; odd number) series.

Each Series name ; Number of "x=0 (mod 3) in {A1, A2,A3}"/6+1/2 .

cf.

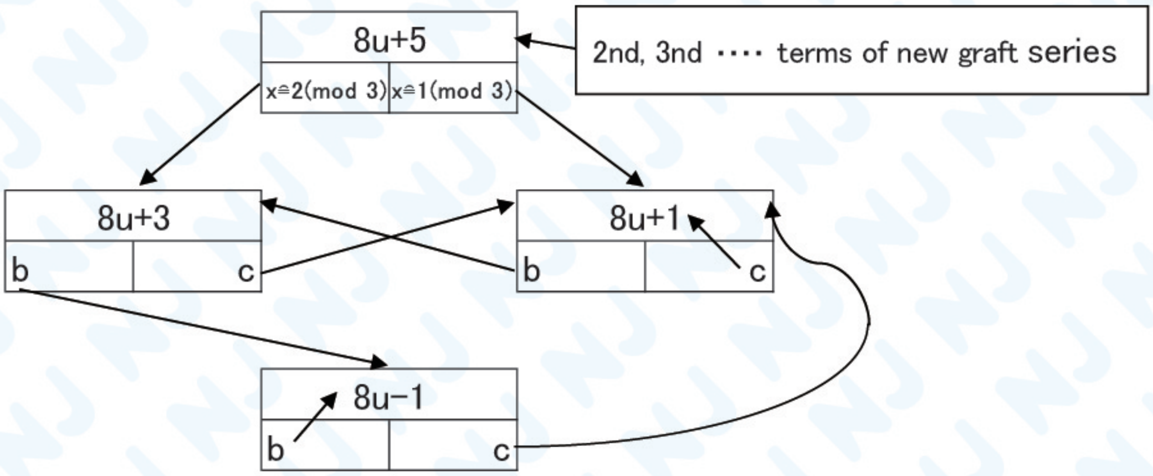
3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93	99	105	111	⋯ ⋯
⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	⇓	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	



3. Discussion II

We analyze 1st terms of these 4N+1 series grafting in Collatz space. Terms of main series are always 8u+5. 8u+3 and 8u+1 graft on 8u+5. 8u−1 graft on 8u+3(x≅2 (mod 3)) and are narrow path. We have examined the order of 8u+5, 8u+3, 8u−1 and 8u+1 (figure 2.).

Figure 2. When new graft series is b-type or c-type, next graft goes on.



"Each a-type" is the stop term(non-graft).
Where a, b & c of each term expresses x≅0, 2 & 1 (mod 3) as same as Table 2.

We have arranged 1st terms of graft series in order of value. Its first page is Figure 3. At the beginning, the right 8u+5; ${}^{3}A_{2}$=13 starts, →17→11→7→9(a type) stops. Next, the left 8u+5; ${}^{117}A_{2}$=29 starts, →19→25→33(a type) stops. ·········

Expressing new series, 2nd, 3rd , 4th·····terms of new series are stocked to 8u+5.

As we have observed till ${}^{3}A_{6}$=3413 starts, →2275→3033(a type) stops, 3〜6(including via 8u+1)terms of 8u−1 appeared sometimes continuously.

Figure 3. shows the important rule on graft path; a (8u+5) starts → some (8u+3, 8u−1 or/and 8u+1) → a (a-type) stops. From the existence ratio of each term (Table 4), 8u+5 (x≅1 and 2 (mod 3)) is 2/12, and then a-type (stop term) of 8u+3, 8u−1 and 8u+1 is 3/12.

∴ Collatz space does not have any part of a-type of 8u+3, 8u−1 and 8u+1.

But Collatz space puts off these to infinite great and continues grafts. And more large numbers reach “1” by Formula (1). There is a fact; any part of a-type of 8u+3, 8u-1 and 8u+1 does not appear forever in Collatz space.

Figure 3. The graft structure of 4u+3 and 8u+1.

		8u+5			4u+3		(mod 3)										8u+1		(mod 3)					8u+5			
		2 (mod 3): goto 8u+3						goto 4u+3	goto 8u+1											goto 8u+3	goto 8u+1			1 (mod 3); go to 8u+1			
	1	5	0.5	→	3	0.3	0																				
					11	1.3	2	7		1	7	−1.1	1		9	0	9	1.1	0								
	7	29	3.5	→	19	2.3	1		25	1	15	−2.1	0				17	2.1	2	11		2	←	13	1.5	3	
					27	3.3	0				23	−3.1	2	15		0	25	3.1	1		33	0					
3	13	53	6.5	→	35	4.3	2	23		2	31	−4.1	1		41	2	33	4.1	0								
					43	5.3	1		57	0	39	−5.1	0				41	5.1	2	27		0					
	19	77	9.5	→	51	6.3	0				47	−6.1	2	31		1	49	6.1	1		65	2	←	37	4.5	9	
					59	7.3	2	39		0	55	−7.1	1		73	1	57	7.1	0								
	25	101	12.5	→	67	8.3	1		89	2	63	−8.1	0				65	8.1	2	43		1					
					75	9.3	0				71	−9.1	2	47		2	73	9.1	1		97	1					
	31	125	15.5	→	83	10.3	2	55		1	79	−10.1	1		105	0	81	10.1	0				←	61	7.5	15	
					91	11.3	1		121	1	87	−11.1	0				89	11.1	2	59		2					
9	37	149	18.5	→	99	12.3	0				95	−12.1	2	63		0	97	12.1	1		129	0					
					107	13.3	2	71		2	103	−13.1	1		137	2	105	13.1	0								
	43	173	21.5	→	115	14.3	1		153	0	111	−14.1	0				113	14.1	2	75		0	←	85	10.5	21	5
					123	15.3	0				119	−15.1	2	79		1	121	15.1	1		161	2					
	49	197	24.5	→	131	16.3	2	87		0	127	−16.1	1		169	1	129	16.1	0								
					139	17.3	1		185	2	135	−17.1	0				137	17.1	2	91		1					
	55	221	27.5	→	147	18.3	0				143	−18.1	2	95		2	145	18.1	1		193	1	←	109	13.5	27	
					155	19.3	2	103		1	151	−19.1	1		201	0	153	19.1	0								
15	61	245	30.5	→	163	20.3	1		217	1	159	−20.1	0				161	20.1	2	107		2					
					171	21.3	0				167	−21.1	2	111		0	169	21.1	1		225	0					
	67	269	33.5	→	179	22.3	2	119		2	175	−22.1	1		233	2	177	22.1	0				←	133	16.5	33	
					187	23.3	1		249	0	183	−23.1	0				185	23.1	2	123		0					
	73	293	36.5	→	195	24.3	0				191	−24.1	2	127		1	193	24.1	1		257	2					
					203	25.3	2	135		0	199	−25.1	1		265	1	201	25.1	0								
	79	317	39.5	→	211	26.3	1		281	2	207	−26.1	0				209	26.1	2	139		1	←	157	19.5	39	
					219	27.3	0				215	−27.1	2	143		2	217	27.1	1		289	1					
21	85	341	42.5	→	227	28.3	2	151		1	223	−28.1	1		297	0	225	28.1	0								
					235	29.3	1		313	1	231	−29.1	0				233	29.1	2	155		2					
	91	365	45.5	→	243	30.3	0				239	−30.1	2	159		0	241	30.1	1		321	0	←	181	22.5	45	11
					251	31.3	2	167		2	247	−31.1	1		329	2	249	31.1	0								
	97	389	48.5	→	259	32.3	1		345	0	255	−32.1	0				257	32.1	2	171		0					
					267	33.3	0				263	−33.1	2	175		1	265	33.1	1		353	2					
	103	413	51.5	→	275	34.3	2	183		0	271	−34.1	1		361	1	273	34.1	0				←	205	25.5	51	
					283	35.3	1		377	2	279	−35.1	0				281	35.1	2	187		1					
27	109	437	54.5	→	291	36.3	0				287	−36.1	2	191		2	289	36.1	1		385	1					
					299	37.3	2	199		1	295	−37.1	1		393	0	297	37.1	0								
	115	461	57.5	→	307	38.3	1		409	1	303	−38.1	0				305	38.1	2	203		2	←	229	28.5	57	
					315	39.3	0				311	−39.1	2	207		0	313	39.1	1		417	0					
	121	485	60.5	→	323	40.3	2	215		2	319	−40.1	1		425	2	321	40.1	0								
					331	41.3	1		441	0	327	−41.1	0				329	41.1	2	219		0					
	127	509	63.5	→	339	42.3	0				335	−42.1	2	223		1	337	42.1	1		449	2	←	253	31.5	63	
					347	43.3	2	231		0	343	−43.1	1		457	1	345	43.1	0								

Table 4. The existence ratio of each term.

	8u+5	8u+3	8u−1	8u+1
Terms: x≡0 (mod 3)	1/12	1/12	1/12	1/12
Terms: x≡2 (mod 3)	1/12	1/12	1/12	1/12
Terms: x≡1 (mod 3)	1/12	1/12	1/12	1/12

4. Reference

1). Ishikura, Tetuya; Asahi newspaper 2021, 1026 (Tue), Kanagawa-Morning-Version.

" Collatz Problem, 宇宙人が仕向けた罠."

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5. Appendix

・Table 5. We see the projection of 4N+1 series, comparing Step up with First down.

Table 5. We see the projection of 4N+1 series ,comparing Step-up with First-down.

step-up			8u+5,3,1,-1	first-down	
ex. AA	123456789	3rd term	15432098.5		123456789
(B-1)/4	30864197	2nd term	3858024.5	(b*3+1)/4	92592592
(B-1)/4	7716049	1st term	964506.1	b/4	23148148
(b*3+1)/4	5787037	2nd term	723379.5	b/4	5787037
(B-1)/4	1446759	1st term	-180845.1	(b*3+1)/2	8680556
(b*3+1)/2	2170139	1st term	271267.3	b/4	2170139
(b*3+1)/2	3255209	1st term	406901.1	(b*3+1)/2	3255209
(b*3+1)/4	2441407	1st term	-305176.1	(b*3+1)/4	2441407
(b*3+1)/2	3662111	1st term	-457764.1	(b*3+1)/2	3662111
(b*3+1)/2	5493167	1st term	-686646.1	(b*3+1)/2	5493167
(b*3+1)/2	8239751	1st term	-1029969.1	(b*3+1)/2	8239751
(b*3+1)/2	12359627	1st term	1544953.3	(b*3+1)/2	12359627
(b*3+1)/2	18539441	1st term	2317430.1	(b*3+1)/2	18539441
(b*3+1)/4	13904581	2nd term	1738072.5	(b*3+1)/4	13904581
(B-1)/4	3476145	1st term	434518.1	(b*3+1)/4	10428436
(b*3+1)/4	2607109	2nd term	325888.5	b/4	2607109
(B-1)/4	651777	1st term	81472.1	(b*3+1)/4	1955332
(b*3+1)/4	488833	1st term	61104.1	b/4	488833
(b*3+1)/4	366625	1st term	45828.1	(b*3+1)/4	366625
(b*3+1)/4	274969	1st term	34371.1	(b*3+1)/4	274969
(b*3+1)/4	206227	1st term	25778.3	(b*3+1)/4	206227
(b*3+1)/2	309341	2nd term	38667.5	(b*3+1)/2	309341
(B-1)/4	77335	1st term	-9667.1	(b*3+1)/2	464012
(b*3+1)/2	116003	1st term	14500.3	b/4	116003
(b*3+1)/2	174005	3rd term	21750.5	(b*3+1)/2	174005
(B-1)/4	43501	2nd term	5437.5	(b*3+1)/2	261008
(B-1)/4	10875	1st term	1359.3	b/4	65252
(b*3+1)/2	16313	1st term	2039.1	b/4	16313
(b*3+1)/4	12235	1st term	1529.3	(b*3+1)/4	12235
(b*3+1)/2	18353	1st term	2294.1	(b*3+1)/2	18353
(b*3+1)/4	13765	2nd term	1720.5	(b*3+1)/4	13765
(B-1)/4	3441	1st term	430.1	(b*3+1)/4	10324
(b*3+1)/4	2581	3rd term	322.5	b/4	2581
(B-1)/4	645	2nd term	80.5	(b*3+1)/4	1936
(B-1)/4	161	1st term	20.1	b/4	484
(b*3+1)/4	121	1st term	15.1	b/4	121
(b*3+1)/4	91	1st term	11.3	(b*3+1)/4	91
(b*3+1)/2	137	1st term	17.1	(b*3+1)/2	137
(b*3+1)/4	103	1st term	-13.1	(b*3+1)/4	103
(b*3+1)/2	155	1st term	19.3	(b*3+1)/2	155
(b*3+1)/2	233	1st term	29.1	(b*3+1)/2	233
(b*3+1)/4	175	1st term	-22.1	(b*3+1)/4	175
(b*3+1)/2	263	1st term	-33.1	(b*3+1)/2	263
(b*3+1)/2	395	1st term	49.3	(b*3+1)/2	395
(b*3+1)/2	593	1st term	74.1	(b*3+1)/2	593
(b*3+1)/4	445	2nd term	55.5	(b*3+1)/4	445
(B-1)/4	111	1st term	-14.1	(b*3+1)/2	668
(b*3+1)/2	167	1st term	-21.1	b/4	167
(b*3+1)/2	251	1st term	31.3	(b*3+1)/2	251
(b*3+1)/2	377	1st term	47.1	(b*3+1)/2	377
(b*3+1)/4	283	1st term	35.3	(b*3+1)/4	283
(b*3+1)/2	425	1st term	53.1	(b*3+1)/2	425
(b*3+1)/4	319	1st term	-40.1	(b*3+1)/4	319
(b*3+1)/2	479	1st term	-60.1	(b*3+1)/2	479
(b*3+1)/2	719	1st term	-90.1	(b*3+1)/2	719
(b*3+1)/2	1079	1st term	-135.1	(b*3+1)/2	1079
(b*3+1)/2	1619	1st term	202.3	(b*3+1)/2	1619
(b*3+1)/2	2429	2nd term	303.5	(b*3+1)/2	2429
(B-1)/4	607	1st term	-76.1	(b*3+1)/2	3644
(b*3+1)/2	911	1st term	-114.1	b/4	911
(b*3+1)/2	1367	1st term	-171.1	(b*3+1)/2	1367
(b*3+1)/2	2051	1st term	256.3	(b*3+1)/2	2051
(b*3+1)/2	3077	2nd term	384.5	(b*3+1)/2	3077
(B-1)/4	769	1st term	96.1	(b*3+1)/4	2308
(b*3+1)/4	577	1st term	72.1	b/4	577
(b*3+1)/4	433	1st term	54.1	(b*3+1)/4	433
(b*3+1)/4	325	2nd term	40.5	(b*3+1)/4	325
(B-1)/4	81	1st term	10.1	(b*3+1)/4	244
(b*3+1)/4	61	2nd term	7.5	b/4	61
(B-1)/4	15	1st term	-2.1	(b*3+1)/2	92
(b*3+1)/2	23	1st term	-3.1	b/4	23
(b*3+1)/2	35	1st term	4.3	(b*3+1)/2	35
(b*3+1)/2	53	3rd term	6.5	(b*3+1)/2	53
(B-1)/4	13	2nd term	1.5	(b*3+1)/2	80
(B-1)/4	3	1st term	0.3	b/4	20
(b*3+1)/2	5	1st term	0.5	b/4	5
(B-1)/4	1			(b*3+1)/4	4
				b/4	1

step-up			8u+5, +3, -1, +1	first-down	
ex. AAA	123456787	1st term	15432098.3		123456787
(b*3+1)/2	185185181	2nd term	23148147.5	(b*3+1)/2	185185181
(B-1)/4	46296295	1st term	-5787037.1	(b*3+1)/2	277777772
(b*3+1)/2	69444443	1st term	8680555.3	b/4	69444443
(b*3+1)/2	104166665	1st term	13020833.1	(b*3+1)/2	104166665
(b*3+1)/4	78124999	1st term	-9765625.1	(b*3+1)/4	78124999
(b*3+1)/2	117187499	1st term	14648437.3	(b*3+1)/2	117187499
(b*3+1)/2	175781249	1st term	21972656.1	(b*3+1)/2	175781249
(b*3+1)/4	131835937	1st term	16479492.1	(b*3+1)/4	131835937
(b*3+1)/4	98876953	1st term	12359619.1	(b*3+1)/4	98876953
(b*3+1)/4	74157715	1st term	9269714.3	(b*3+1)/4	74157715
(b*3+1)/2	111236573	2nd term	13904571.5	(b*3+1)/2	111236573
(B-1)/4	27809143	1st term	-3476143.1	(b*3+1)/2	166854860
(b*3+1)/2	41713715	1st term	5214214.3	b/4	41713715
(b*3+1)/2	62570573	2nd term	7821321.5	(b*3+1)/2	62570573
(B-1)/4	15642643	1st term	1955330.3	(b*3+1)/2	93855860
(b*3+1)/2	23463965	2nd term	2932995.5	b/4	23463965
(B-1)/4	5865991	1st term	-733249.1	(b*3+1)/2	35195948
(b*3+1)/2	8798987	1st term	1099873.3	b/4	8798987
(b*3+1)/2	13198481	1st term	1649810.1	(b*3+1)/2	13198481
(b*3+1)/4	9898861	2nd term	1237357.5	(b*3+1)/4	9898861
(B-1)/4	2474715	1st term	309339.3	(b*3+1)/2	14848292
(b*3+1)/2	3712073	1st term	464009.1	b/4	3712073
(b*3+1)/4	2784055	1st term	-348007.1	(b*3+1)/4	2784055
(b*3+1)/2	4176083	1st term	522010.3	(b*3+1)/2	4176083
(b*3+1)/2	6264125	2nd term	783015.5	(b*3+1)/2	6264125
(B-1)/4	1566031	1st term	-195754.1	(b*3+1)/2	9396188
(b*3+1)/2	2349047	1st term	-293631.1	b/4	2349047
(b*3+1)/2	3523571	1st term	440446.3	(b*3+1)/2	3523571
(b*3+1)/2	5285357	2nd term	660669.5	(b*3+1)/2	5285357
(B-1)/4	1321339	1st term	165167.3	(b*3+1)/2	7928036
(b*3+1)/2	1982009	1st term	247751.1	b/4	1982009
(b*3+1)/4	1486507	1st term	185813.3	(b*3+1)/4	1486507
(b*3+1)/2	2229761	1st term	278720.1	(b*3+1)/2	2229761
(b*3+1)/4	1672321	1st term	209040.1	(b*3+1)/4	1672321
(b*3+1)/4	1254241	1st term	156780.1	(b*3+1)/4	1254241
(b*3+1)/4	940681	1st term	117585.1	(b*3+1)/4	940681
(b*3+1)/4	705511	1st term	-88189.1	(b*3+1)/4	705511
(b*3+1)/2	1058267	1st term	132283.3	(b*3+1)/2	1058267
(b*3+1)/2	1587401	1st term	198425.1	(b*3+1)/2	1587401
(b*3+1)/4	1190551	1st term	-148819.1	(b*3+1)/4	1190551
(b*3+1)/2	1785827	1st term	223228.3	(b*3+1)/2	1785827
(b*3+1)/2	2678741	4th term	334842.5	(b*3+1)/2	2678741
(B-1)/4	669685	3rd term	83710.5	(b*3+1)/2	4018112
(B-1)/4	167421	2nd term	20927.5	b/4	1004528
(B-1)/4	41855	1st term	-5232.1	b/4	251132
(b*3+1)/2	62783	1st term	-7848.1	b/4	62783
(b*3+1)/2	94175	1st term	-11772.1	(b*3+1)/2	94175
(b*3+1)/2	141263	1st term	-17658.1	(b*3+1)/2	141263
(b*3+1)/2	211895	1st term	-26487.1	(b*3+1)/2	211895
(b*3+1)/2	317843	1st term	39730.3	(b*3+1)/2	317843
(b*3+1)/2	476765	2nd term	59595.5	(b*3+1)/2	476765
(B-1)/4	119191	1st term	-14899.1	(b*3+1)/2	715148
(b*3+1)/2	178787	1st term	22348.3	b/4	178787
(b*3+1)/2	268181	3rd term	33522.5	(b*3+1)/2	268181
(B-1)/4	67045	2nd term	8380.5	(b*3+1)/4	201136
(B-1)/4	16761	1st term	2095.1	b/4	50284
(b*3+1)/4	12571	1st term	1571.3	b/4	12571
(b*3+1)/2	18857	1st term	2357.1	(b*3+1)/2	18857
(b*3+1)/4	14143	1st term	-1768.1	(b*3+1)/4	14143
(b*3+1)/2	21215	1st term	-2652.1	(b*3+1)/2	21215
(b*3+1)/2	31823	1st term	-3978.1	(b*3+1)/2	31823
(b*3+1)/2	47735	1st term	-5967.1	(b*3+1)/2	47735
(b*3+1)/2	71603	1st term	8950.3	(b*3+1)/2	71603
(b*3+1)/2	107405	2nd term	13425.5	(b*3+1)/2	107405
(B-1)/4	26851	1st term	3356.3	(b*3+1)/2	161108
(b*3+1)/2	40277	6th term	5034.5	b/4	40277
(B-1)/4	10069	5th term	1258.5	(b*3+1)/2	60416
(B-1)/4	2517	4th term	314.5	b/4	15104
(B-1)/4	629	3rd term	78.5	b/4	3776
(B-1)/4	157	2nd term	19.5	b/4	944
(B-1)/4	39	1st term	-5.1	b/4	236
(b*3+1)/2	59	1st term	7.3	b/4	59
(b*3+1)/2	89	1st term	11.1	(b*3+1)/2	89
(b*3+1)/4	67	1st term	8.3	(b*3+1)/4	67
(b*3+1)/2	101	2nd term	12.5	(b*3+1)/2	101
(B-1)/4	25	1st term	3.1	(b*3+1)/4	76
(b*3+1)/4	19	1st term	2.3	b/4	19
(b*3+1)/2	29	2nd term	3.5	(b*3+1)/2	29
(B-1)/4	7	1st term	-1.1	(b*3+1)/2	44
(b*3+1)/2	11	1st term	1.3	b/4	11
(b*3+1)/2	17	1st term	2.1	(b*3+1)/2	17
(b*3+1)/4	13	2nd term	1.5	(b*3+1)/4	13
(B-1)/4	3	1st term	0.3	(b*3+1)/2	20
(b*3+1)/2	5	1st term	0.5	b/4	5
(B-1)/4	1			(b*3+1)/4	4
				b/4	1