

Polynomials Generating Twin Prime Numbers

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Abstract

In the Ulam spiral, there are places where prime numbers appear continuously on line. Integers are arranged in a square spiral in the Ulam spiral. I thought that if integers are arranged differently, other continuous prime numbers would appear. Therefore, I arrange integers in the angles of 45, 90, 135, 180, 225, 270, 315, 153, 160 degrees, etc.. Then, prime numbers appeared continuously on line. And usually, integers are arranged, but I wonder what would happen if I arranged odd numbers. I arrange odd numbers in the angles of 45, 90, 135, 180, 225, 270, 315, 360, 153, 160 degrees, etc.. Then, twin prime numbers appeared continuously on line etc.. I found many polynomials generating 14 to 4 consecutive twin prime numbers.

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1 Introduction

I was interested in prime numbers looking at the Ulam spiral, I analyzed it myself. And I learned that Euler's polynomial generating prime numbers is simple and great. I thought that other polynomials generating prime numbers may be found in other arrangements, I investigate. In addition, I thought that polynomials generating twin prime numbers may be found by arranging add numbers. I found many polynomials generating 14 to 4 consecutive twin prime numbers, and I collect the results.

These algebraic polynomials have the property that for $n = 0, 1, \dots, m-1$ value of the polynomial, eventually in module, are m primes.

2 Polynomials generating prime numbers

2.1 The Ulam spiral

In the Ulam spiral, there are places where prime numbers appear continuously on line. I noticed that there are places where prime numbers appear continuously in a certain pattern in the Ulam spiral, although they do not appear continuously on line. They are two polynomials, $P(n) = 4n^2 + 2n + 41$ and $P(n) = 4n^2 + 6n + 43$, generates 20 primes, see Figure 2.1. Each value is a value obtained by skipping one of Euler prime numbers. When the values of the two polynomials are inserted alternately, the values are the same as values of Euler prime numbers, see Figure 2.1.

2.2 Polynomial generating prime numbers 1

Integers are arranged in a square spiral in the Ulam spiral, but I thought that if integers are arranged differently, other continuous prime numbers would appear. Therefore, I arrange integers in the angles of 45, 90, 135, 180, 225, 270, 315, 153, 160 degrees, etc., using a computer. Then, prime numbers appeared continuously on line.

In 180 degrees arrangement, see Figure 2.2, 29 prime numbers appear continuously. It was prime numbers of Legendre polynomial [1798], $P(n) = 2n^2 + 29$, generates 29 primes: 29, 31, 37, 47, 61, 79, 101, 127, 157, 191, 229, 271, 317, 367, 421, 479, 541, 607, 677, 751, 829, 911, 997, 1087, 1181, 1279, 1381, 1487, 1597.

2.3 Polynomial generating prime numbers 2

In 135 degrees arrangement, see Figure 2.3, 29 prime numbers appear continuously. It was prime numbers of Brox polynomial [2006], $P(n) = 6n^2 - 342n + 4903$ (or $6n^2 + 6n + 31$), generates 29 primes: 4903, 4567, 4243, 3931, 3631, 3343, 3067, 2803, 2551, 2311, 2083, 1867, 1663, 1471, 1291, 1123, 967, 823, 691, 571, 463, 367, 283, 211, 151, 103, 67, 43, 31 . Also, in Figure 2.3, prime numbers of polynomials, $P(n) = 6n^2 + 6n + p$, p are lucky numbers $p = 5, 7, 11, 17, 31$, are clearly appeared. In addition, prime numbers of polynomials, $P(n) = 6n^2 + p$, p are lucky numbers $p = 5, 7, 13, 17$, are clearly appeared.

2.4 Polynomial generating prime numbers 3

In 270 degrees arrangement, see Figure 2.4, 22 prime numbers appear continuously. It was prime numbers of Frame polynomial [2018], $P(n) = 3n^2 + 3n + 23$, generates 22 primes: 23, 29, 41, 59, 83, 113, 149, 191, 239, 293, 353, 419, 491, 569, 653, 743, 839, 941, 1049, 1163, 1283, 1409 .

2.5 Euler's polynomial generating prime numbers

In 90 degrees arrangement, see Figure 2.5 and the hexagonal 90 degrees arrangement, see Figure 2.6 (illustrated as a rectangle for simplification in Figure 2.6), 40 prime numbers appear continuously. It was prime numbers of Euler's polynomial, $P(n) = n^2 + n + 41$, generates 40 primes. Also, prime numbers of polynomial, $P(n) = n^2 + n + p$, p are Euler's lucky numbers $p = 3, 5, 11, 17, 41$, are clearly appeared.

2.6 Other polynomials generating prime numbers

I found polynomials generating prime numbers with small continuous numbers, and I will collect them in the future.

3 Polynomials generating twin prime numbers

Integers are arranged in the Ulam spiral, but I wonder what would happen if I arranged odd numbers. I arrange odd numbers in the angles of 45, 90, 135, 180, 225, 270, 315, 360, 153, 160 degrees, etc., using a computer. I mark the twin prime numbers. (In the figure of 360 degrees, I mark the prime numbers and twin prime numbers.) Then, twin prime numbers appeared continuously on line etc.. I found many polynomials generating twin prime numbers. The generating appearance of prime numbers are diagonal, vertical, and horizontal lines and evenly spaced, but the generating appearance of twin prime numbers are diagonal, vertical, horizontal, and curved lines and evenly spaced or not-evenly spaced.

3.1 Polynomial generating twin prime numbers 1

When odd numbers are arranged in 45 degrees arrangement, see Figure 3.1, continuous twin prime numbers appear.

The produce of polynomial is as follows. (Since the method of obtaining the polynomial in Section 3.1 is difficult to understand, so I recommend to refer to the method of obtaining the polynomial in Section 3.2.) The central values of the twin prime numbers are 12, 42, 102, 192, 312, 462, 642.

12		12	n=0
42	30	30	n=1
102	60	30	n=2
192	90	30	n=3
312	120	30	n=4
462	150	30	n=5
642	180	30	n=5
		$42=(12+30)$ $=12+30 \times 1$	
		$102=(12+30)+(30+30)$ $=12+30 \times 2+30 \times 1$	
		$192=(12+30)+(30+30)+(30+30+30)$ $=12+30 \times 3+30 \times 3$	
		$312=(12+30)+(30+30)+(30+30+30)+(30+30+30+30)$ $=12+30 \times 4+30 \times 6$	
		$462=(12+30)+(30+30)+(30+30+30)+(30+30+30+30)$ $+ (30+30+30+30+30)=12+30 \times 5+30 \times 10$	
		$642 = \dots$	
		$f(n)=12+30n+30xn(n-1)/2=12+30n+15n^2-15n=15n^2+15n+12$	

This polynomial is twin prime numbers even if $n = -1$ to -7 , so I insert $n=n-7$,

$$f(n)=15(n-7)^2+15(n-7)+12=15n^2-15 \times 2 \times 7n+15 \times 7 \times 7+15n-15 \times 7+12=15n^2-210n+735+15n-105+12$$

$$=15n^2-195n+642$$

This is polynomial generating 14 twin prime numbers.

$P(n) = 15n^2 \cdot 195n + 642 \pm 1$, generates 14 twin primes: 641/643, 461/463, 311/313, 191/193, 101/103, 41/43, 11/13, 11/13, 41/43, 101/103, 191/193, 311/313, 461/463, 641/643 .

But since the same twin prime numbers take twice each, so it is polynomial that 7 succession appear twice.

3.2 Polynomial generating twin prime numbers 2

When odd numbers are arranged in 180 degrees arrangement, see Figure 3.2, continuous twin prime numbers appear.

The produce of polynomial is as follows. The central values of the twin prime numbers are 60, 150, 270, 420, 600, 810, 1050, 1320, 1620, 1950, 2310.

60		60	$n=0$	
150	90	30	$150=(60+90)$	$n=1$
	120		$=60+90 \times 1$	
270	150	30	$270=(60+90)+(90+30)$	$n=2$
	180		$=60+90 \times 2+30 \times 1$	
420	210	30	$420=(60+90)+(90+30)+(90+30+30)$	$n=3$
	240		$=60+90 \times 3+30 \times 3$	
600		30	$600=(60+90)+(90+30)+(90+30+30)+(90+30+30+30)$	$n=4$
			$=60+90 \times 4+30 \times 6$	
810		30	$810=(60+90)+(90+30)+(90+30+30)+(90+30+30+30)$	$n=5$
			$+(90+30+30+30+30)=60+90 \times 5+30 \times 10$	
1050			$1050 = \dots$	
			$f(n)=60+90n+30 \times n(n-1)/2=60+90n+15n^2-15n=15n^2+75n+60$	

This is polynomial generating 11 twin prime numbers.

$P(n) = 15n^2 + 75n + 60 \pm 1$, generates 11 twin primes: 59/61, 149/151, 269/271, 419/421, 599/601, 809/811, 1049/1051, 1319/1321, 1619/1621, 1949/1951, 2309/2311 .

3.3 Polynomial generating twin prime numbers 3

When odd numbers are arranged in 270 degrees arrangement, see Figure 3.3,

continuous twin prime numbers appear.

The produce of polynomial is as follows. The central values of the twin prime numbers are 6, 12, 30, 60, 102.

6		6	n=0
12	6	12	n=1
30	18	12	n=2
60	30	12	n=3
102	42	12	n=4

$$\begin{aligned}
 12 &= (6+6) \\
 &= 6+6 \times 1 \\
 30 &= (6+6) + (6+12) \\
 &= 6+6 \times 2 + 12 \times 1 \\
 60 &= (6+6) + (6+12) + (6+12+12) \\
 &= 6+6 \times 3 + 12 \times 3 \\
 102 &= (6+6) + (6+12) + (6+12+12) + (6+12+12+12) \\
 &= 6+6 \times 4 + 12 \times 6 \\
 f(n) &= 6+6n+12 \times n(n-1)/2 = 6+6n+6n^2-6n = 6n^2+6
 \end{aligned}$$

This polynomial is twin prime numbers even if $n = -1$ to -4 , so I insert $n=n-4$

$$f(n) = 6(n-4)^2 + 6 = 6n^2 - 6 \times 2 \times 4n + 6 \times 4 \times 4 + 6 = 6n^2 - 48n + 96 + 6 = 6n^2 - 48n + 102$$

This is polynomial generating 9 twin prime numbers.

$P(n) = 6n^2 - 48n + 102 \pm 1$, generates 9 twin primes: 101/103, 59/61, 29/31, 11/13, 5/7, 11/13, 29/31, 59/61, 101/103.

But since the same twin prime numbers take twice each, so it is polynomial that 5 succession appear twice.

3.4 Polynomial generating twin prime numbers 4

When odd numbers are arranged in 360 degrees arrangement, see Figure 3.4, continuous twin prime numbers appear.

The produce of polynomial is as follows. The central values of the twin prime numbers are 18, 12, 150, 432, 858, 1428, 2142, 3000, 4002.

18		18	n=0
12	-6	144	n=1
150	138	144	n=2

$$\begin{aligned}
 12 &= (18-6) \\
 &= 18-6 \times 1 \\
 150 &= (18-6) + (-6+144)
 \end{aligned}$$

$\left. \begin{array}{l} 432 \\ 858 \\ 1428 \\ 2142 \end{array} \right\} \begin{array}{l} 282 \\ 426 \\ 570 \\ 714 \end{array}$	$\left. \begin{array}{l} 144 \\ 144 \\ 144 \end{array} \right\}$	$\begin{aligned} &=18 \cdot 6x^2 + 144x^1 \\ 432 &= (18 \cdot 6) + (-6 + 144) + (-6 + 144 + 144) \\ &= 18 \cdot 6x^3 + 144x^3 \\ 858 &= (18 \cdot 6) + (-6 + 144) + (-6 + 144 + 144) + (-6 + 144 + 144 + 144) \\ &= 18 \cdot 6x^4 + 144x^6 \\ 1428 &= (18 \cdot 6) + (-6 + 144) + (-6 + 144 + 144) + (-6 + 144 + 144 + 144) \\ &\quad + (-6 + 144 + 144 + 144 + 144) = 18 \cdot 6x^5 + 144x^{10} \\ 1050 &= \dots \end{aligned}$	$\begin{aligned} n=3 \\ n=4 \\ n=5 \end{aligned}$
		$f(n) = 18 \cdot 6n + 144n(n-1)/2 = 18 \cdot 6n + 72n^2 - 72n = 72n^2 - 78n + 18$	

This is polynomial generating 9 twin prime numbers.

$P(n) = 72n^2 - 78n + 18 \pm 1$, generates 9 twin primes: 17/19, 11/13, 149/151, 431/433, 857/859, 1427/1429, 2141/2143, 2999/3001, 4001/4003 .

3.5 Polynomial generating twin prime numbers 5

When odd numbers are arranged in 60 degrees arrangement, see Figure 3.5, continuous twin prime numbers appear.

Since the method of obtaining the polynomial is the same as the method described above, so it will be omitted below.

This is polynomial generating 7 twin prime numbers.

$P(n) = 75n^2 - 345n + 420 \pm 1$, generates 7 twin primes: 419/421, 149/151, 29/31, 59/61, 239/241, 569/571, 1049/1051 .

3.6 Polynomial generating twin prime numbers 6

When odd numbers are arranged in 180 degrees arrangement, see Figure 3.6, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 3n^2 + 21n + 18 \pm 1$, generates 6 twin primes: 17/19, 41/43, 71/73, 107/109, 149/151, 197/199 .

3.7 Polynomial generating twin prime numbers 7

When odd numbers are arranged in 135 degrees arrangement, see Figure 3.7, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 3n^2 + 27n + 72 \pm 1$, generates 6 twin primes: 71/73, 101/103, 137/139, 179/181, 227/229, 281/283 .

3.8 Polynomial generating twin prime numbers 8

When odd numbers are arranged in 180 degrees arrangement, see Figure 3.8, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 3n^2 + 69n + 198 \pm 1$, generates 6 twin primes: 197/199, 269/271, 347/349, 431/433, 521/523, 617/619 .

3.9 Polynomial generating twin prime numbers 9

When odd numbers are arranged in 160 degrees arrangement, see Figure 3.9, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 6n^2 - 30n + 42 \pm 1$, generates 6 twin primes: 41/43, 17/19, 5/7, 5/7, 17/19, 41/43 .

But since the same twin prime numbers take twice each, so it is polynomial that 3 succession appear twice.

3.10 Polynomial generating twin prime numbers 10

When odd numbers are arranged in 60 degrees arrangement, see Figure 3.10, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 75n^2 - 165n + 102 \pm 1$, generates 6 twin primes: 101/103, 11/13, 71/73, 281/283, 641/643, 1151/1153 .

3.11 Polynomial generating twin prime numbers 11

When odd numbers are arranged in 225 degrees arrangement, see Figure 3.11, continuous twin prime numbers appear.

This is polynomial generating 6 twin prime numbers.

$P(n) = 153n^2 - 135n + 180 \pm 1$, generates 6 twin primes: 179/181, 197/199, 521/523, 1151/1153, 2087/2089, 3329/3331 .

3.12 Polynomial generating twin prime numbers 12

When odd numbers are arranged in 360 degrees arrangement, see Figure 3.12, continuous twin prime numbers appear.

This is polynomial generating 5 twin prime numbers.

$P(n) = 288n^2 - 180n + 30 \pm 1$, generates 5 twin primes: 29/31, 137/139, 821/823, 2081/2083, 3917/3919 .

3.13 Other polynomials generating twin prime numbers

I found many polynomials generating 4 twin prime numbers. The details of diagrams are omitted. The polynomials found in Figure 3.1 to Figure 3.12 are shown in the figures. The figures of polynomials found in the figures other than Figure 3.1 to Figure 3.12 are omitted.

3.13.1 $P(n) = 3n^2 + 69n + 1878 \pm 1$, generates 4 twin primes:
1877/1879, 1949/1951, 2027/2029, 2111/2113 .

3.13.2 $P(n) = 3n^2 + 141n + 1788 \pm 1$, generates 4 twin primes:
1787/1789, 1931/1933, 2081/2083, 2237/2239 .

3.13.3 $P(n) = 6n^2 + 222n + 2082 \pm 1$, generates 4 twin primes:
2081/2083, 2309/2311, 2549/2551, 2801/2803 .

3.13.4 $P(n) = 9n^2 + 3n + 18 \pm 1$, generates 4 twin primes:
17/19, 29/31, 59/61, 107/109 .

3.13.5 $P(n) = 12n^2 + 54n + 42 \pm 1$, generates 4 twin primes:
41/43, 107/109, 197/199, 311/313 .

3.13.6 $P(n) = 12n^2 + 174n + 1092 \pm 1$, generates 4 twin primes:
1091/1093, 1277/1279, 1487/1489, 1721/1723 .

3.13.7 $P(n) = 18n^2 + 240n + 600 \pm 1$, generates 4 twin primes:
599/601, 857/859, 1151/1153, 1481/1483 .

- 3.13.8 $P(n) = 18n^2 + 252n + 1032 \pm 1$, generates 4 twin primes:
1031/1033, 1301/1303, 1607/1609, 1949/1951 .
- 3.13.9 $P(n) = 27n^2 + 453n + 1788 \pm 1$, generates 4 twin primes:
1787/1789, 2267/2269, 2801/2803, 3389/3391 .
- 3.13.10 $P(n) = 33n^2 + 519n + 1998 \pm 1$, generates 4 twin primes:
1997/1999, 2549/2551, 3167/3169, 3851/3853 .
- 3.13.11 $P(n) = 48n^2 + 150n + 150 \pm 1$, generates 4 twin primes:
149/151, 347/349, 641/643, 1031/1033 .
- 3.13.12 $P(n) = 51n^2 + 657n + 570 \pm 1$, generates 4 twin primes:
569/571, 1277/1279, 2087/2089, 2999/3001 .
- 3.13.13 $P(n) = 78n^2 + 228n + 42 \pm 1$, generates 4 twin primes:
41/43, 347/349, 809/811, 1427/1429 .
- 3.13.14 $P(n) = 90n^2 + 150n + 822 \pm 1$, generates 4 twin primes:
821/823, 1061/1063, 1481/1483, 2081/2083 .
- 3.13.15 $P(n) = 99n^2 + 363n + 108 \pm 1$, generates 4 twin primes:
107/109, 569/571, 1229/1231, 2087/2089 .
- 3.13.16 $P(n) = 102n^2 + 72n + 18 \pm 1$, generates 4 twin primes:
17/19, 191/193, 569/571, 1151/1153 .
- 3.13.17 $P(n) = 150n^2 - 90n + 12 \pm 1$, generates 4 twin primes:
11/13, 71/73, 431/433, 1091/1093 .
- 3.13.18 $P(n) = 201n^2 + 57n + 570 \pm 1$, generates 4 twin primes:
569/571, 827/829, 1487/1489, 2549/2551 .
- 3.13.19 $P(n) = 255n^2 - 75n + 12 \pm 1$, generates 4 twin primes:
11/13, 191/193, 881/883, 2081/2083 .

- 3.13.20 $P(n) = 294n^2 - 462n + 348 \pm 1$, generates 4 twin primes:
347/349, 179/181, 599/601, 1607/1609 .
- 3.13.21 $P(n) = 375n^2 - 555n + 420 \pm 1$, generates 4 twin primes:
419/421, 239/241, 809/811, 2129/2131 .
- 3.13.22 $P(n) = 390n^2 + 90n + 138 \pm 1$, generates 4 twin primes:
137/139, 617/619, 1877/1879, 3917/3919 .
- 3.13.23 $P(n) = -12n^2 + 582n + 312 \pm 1$, generates 4 twin primes:
311/313, 881/883, 1427/1429, 1949/1951 .
- 3.13.24 $P(n) = -45n^2 + 555n + 348 \pm 1$, generates 4 twin primes:
347/349, 857/859, 1277/1279, 1607/1609 .
- 3.13.25 $P(n) = 90n + 1608 \pm 1$, generates 4 twin primes:
1607/1609, 1697/1699, 1787/1789, 1877/1879 .

Figure 2.1: The Ulam Spiral

Euler's prime numbers

$$n^2 + n + 41$$

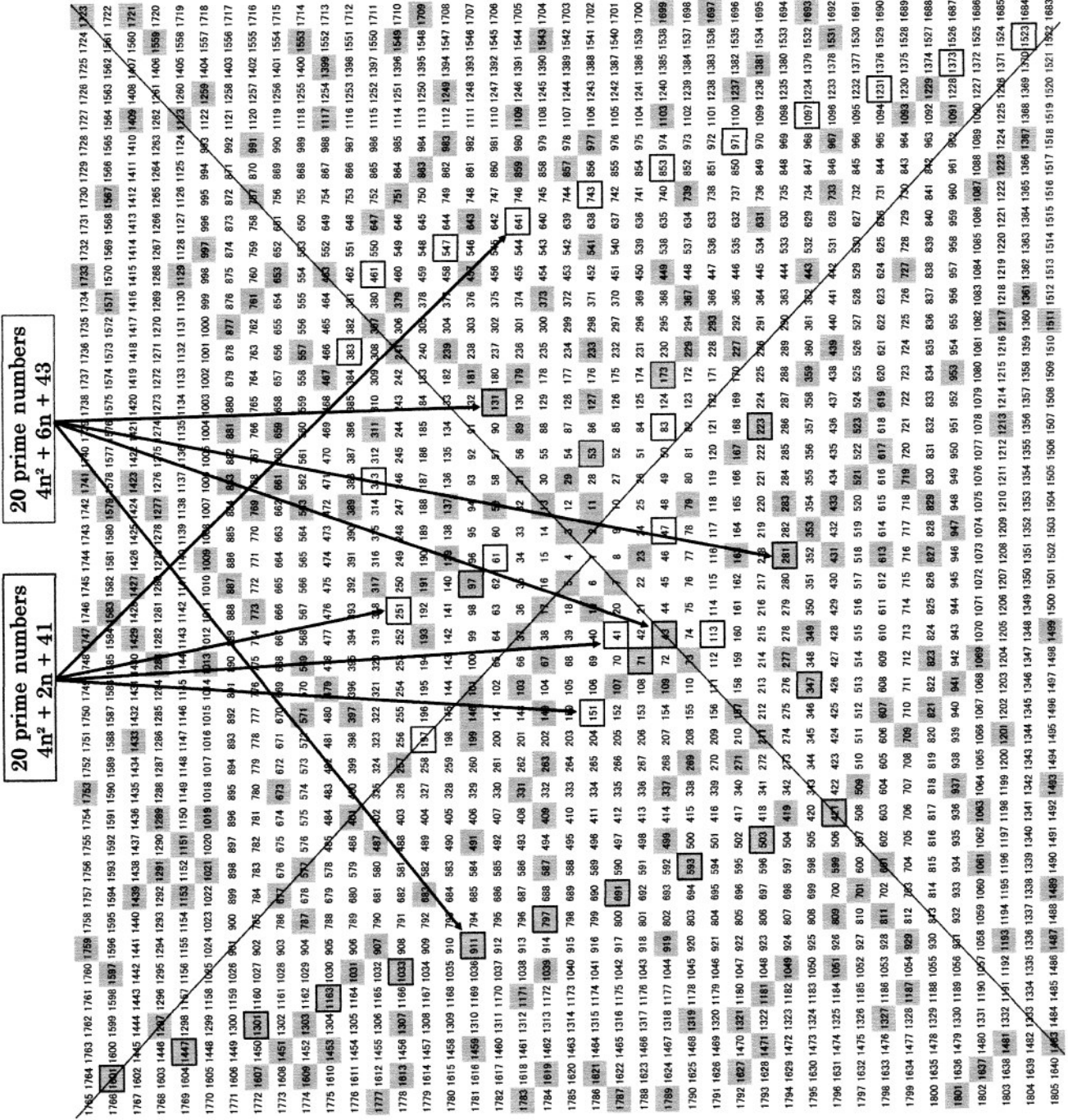
$$4n^2 + 2n + 41$$

$$4n^2 + 6n + 43$$

$$20 \text{ prime numbers } 4n^2 + 6n + 43$$

$$20 \text{ prime numbers } 4n^2 + 2n + 41$$

- 41
- 43
- 47
- 53
- 61
- 71
- 83
- 97
- 113
- 131
- 151
- 173
- 197
- 223
- 251
- 281
- 313
- 347
- 383
- 421
- 461
- 503
- 547
- 593
- 641
- 691
- 743
- 797
- 853
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- 1033
- 1097
- 1163
- 1231
- 1301
- 1373
- 1447
- 1523
- 1601



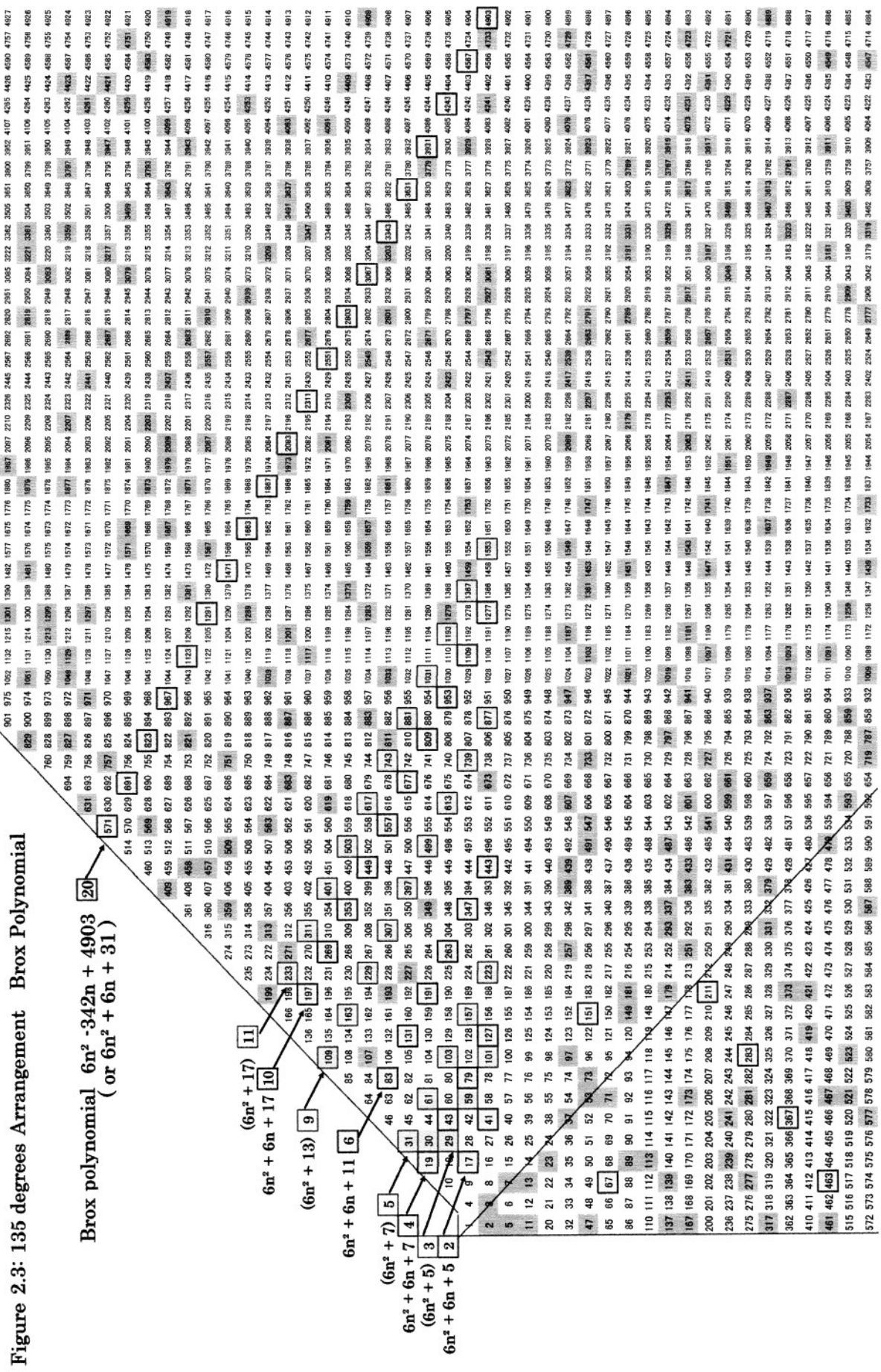


Figure 2.4: 270 degrees Arrangement Frame Polynomial

Frame polynomial $3n^2 + 3n + 23$

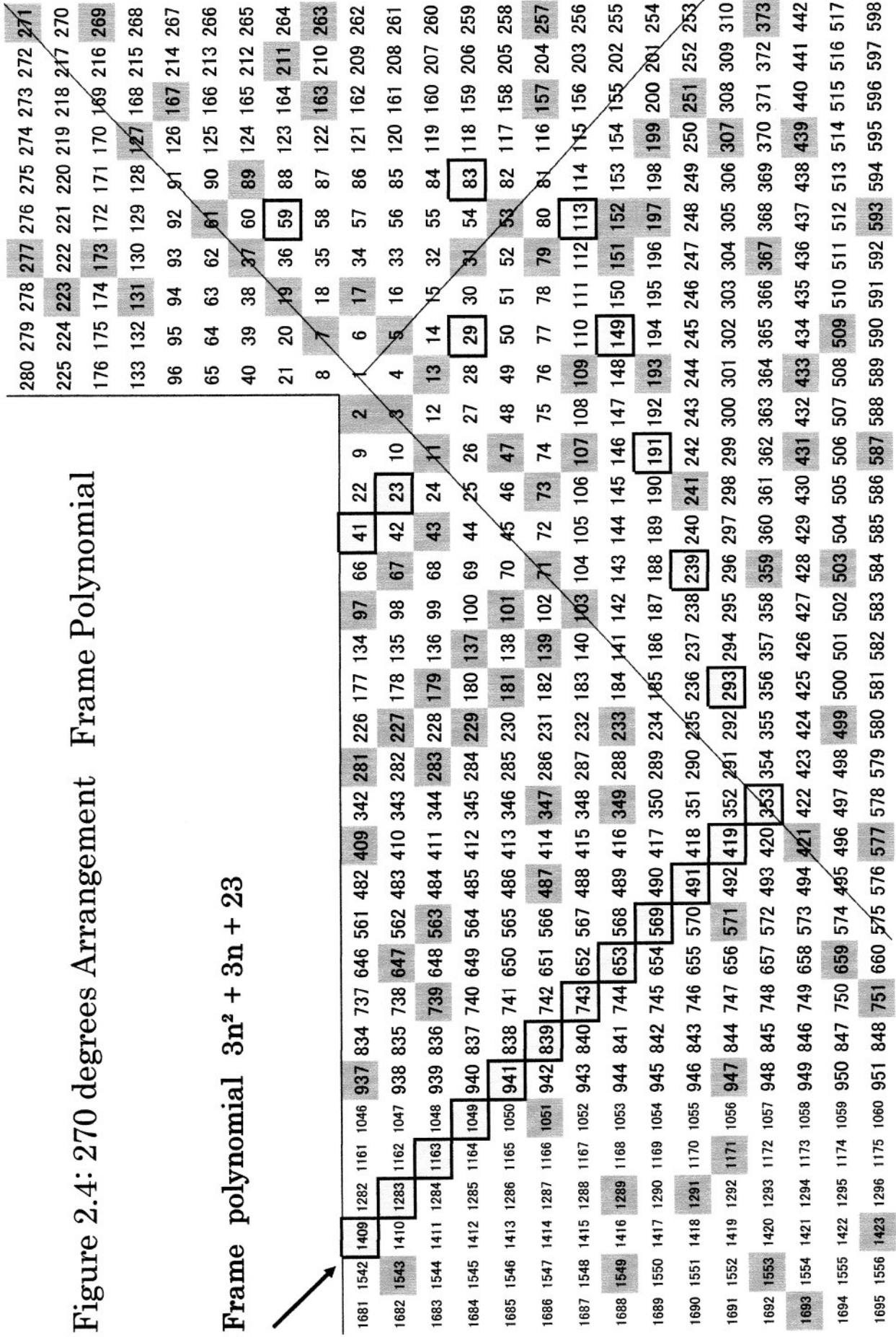


Figure 2.5: 90 degrees Arrangement Euler's Polynomial

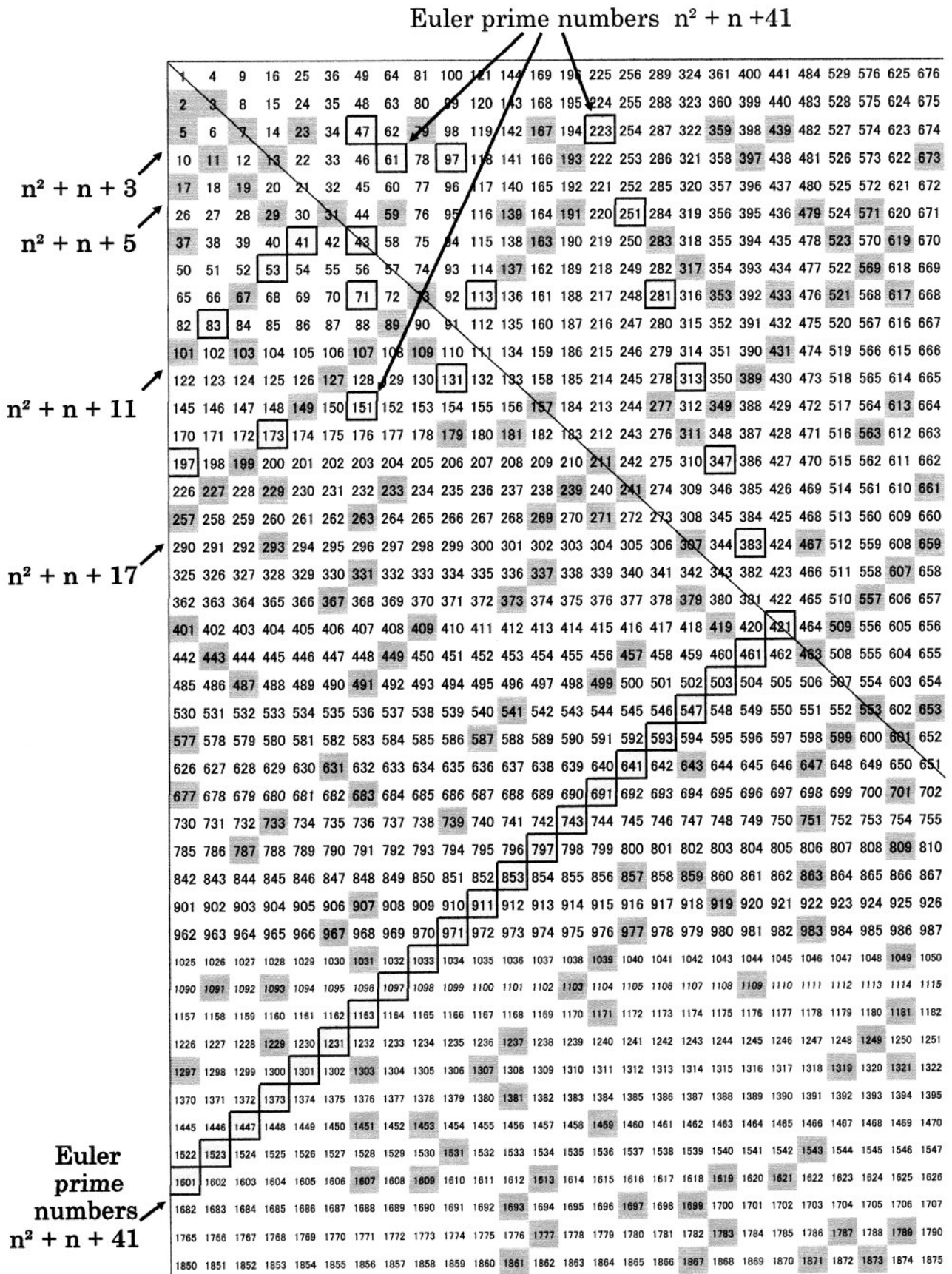


Figure 2.6: Hexagonal 90 degrees Arrangement Euler's Polynomial

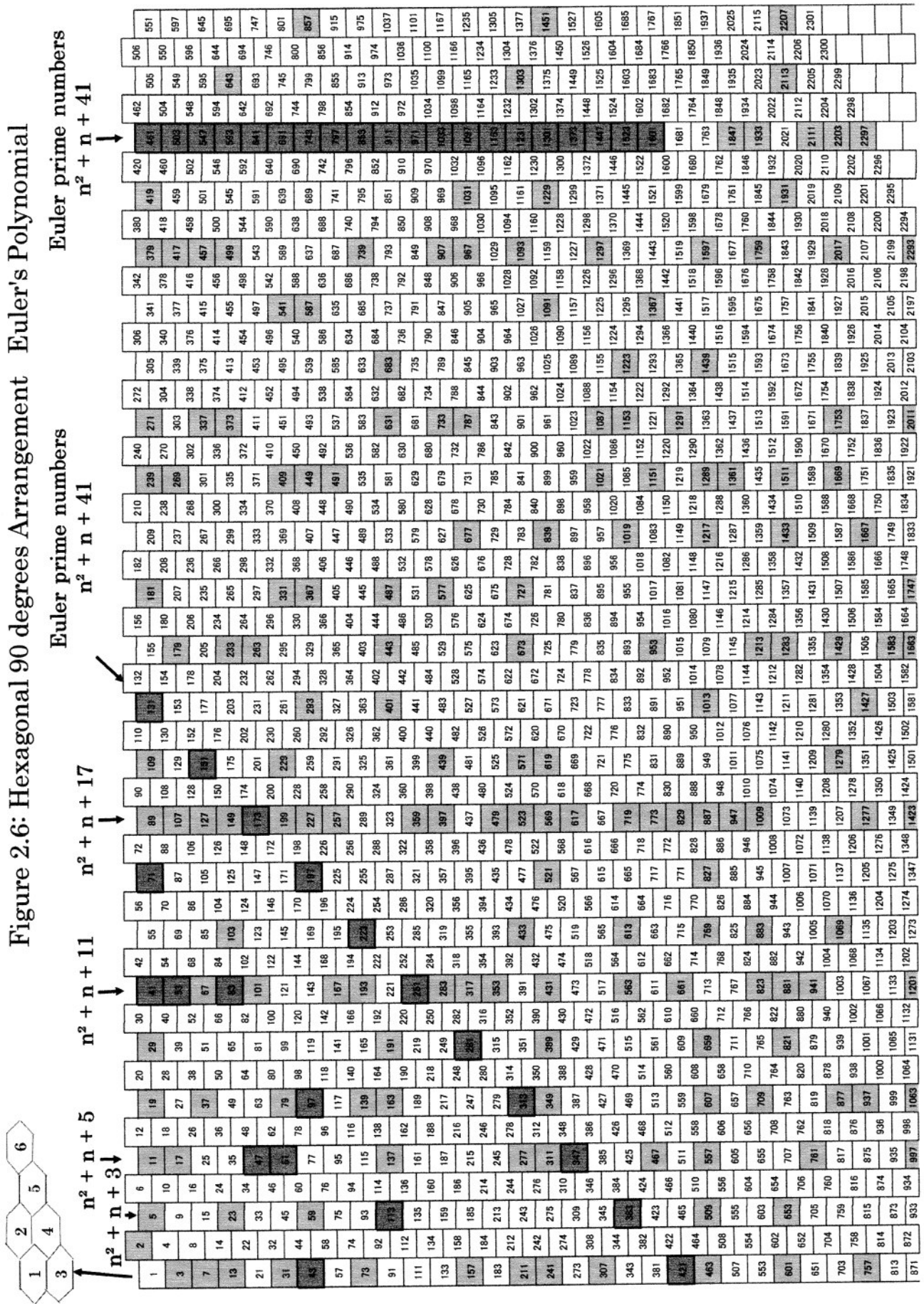


Figure 3.1: 45 degrees Arrangement

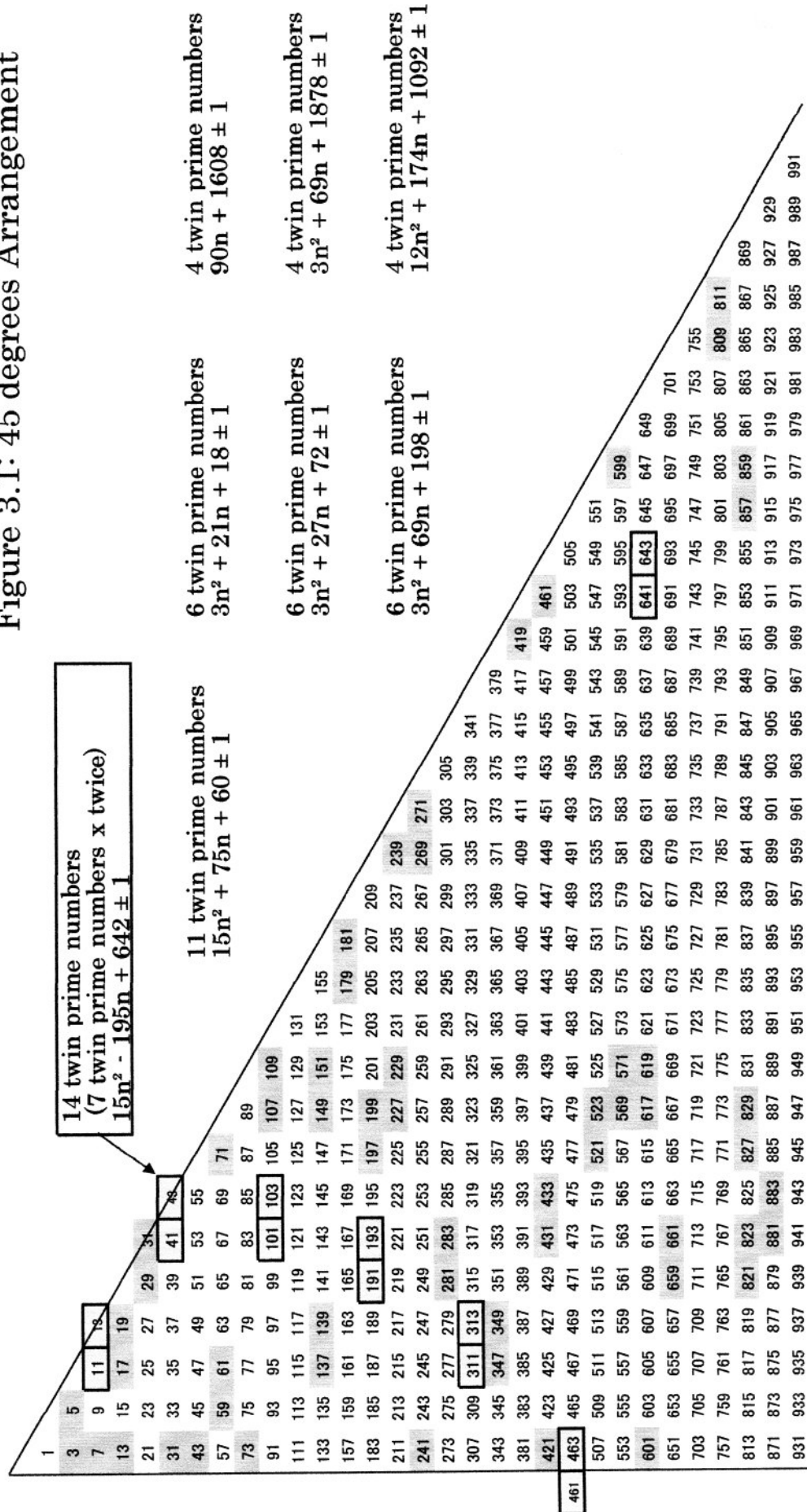


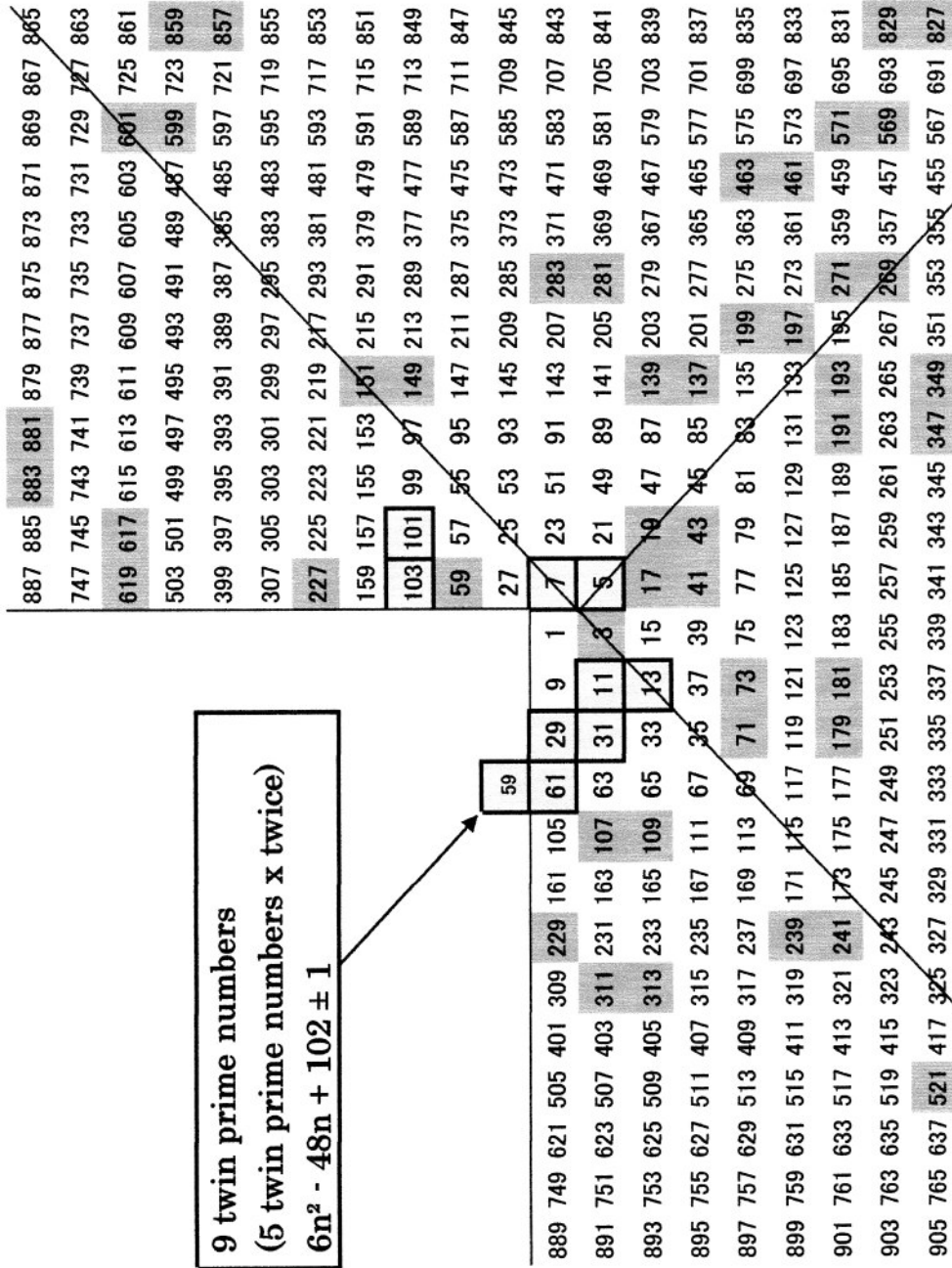
Figure 3.2: 180 degrees Arrangement

11 twin prime numbers $15n^2 + 75n + 60 \pm 1$																																				
2451	2257	2071	1893	1723	1561	1407	1261	1123	993	871	757	651	553	463	381	307	241	183	133	91	57	31	13	3	1	11	29	55	89	131	181	239				
2453	2259	2073	1895	1725	1563	1409	1263	1125	995	873	759	653	555	465	383	309	243	185	135	93	59	33	15	5	7	9	27	53	87	129	179	237				
2455	2261	2075	1897	1727	1565	1411	1265	1127	997	875	761	655	557	467	385	311	245	187	137	95	61	35	17	19	21	23	25	51	85	127	177	235				
2457	2263	2077	1899	1729	1567	1413	1267	1129	999	877	763	657	559	469	387	313	247	189	139	97	63	37	39	41	43	45	47	49	83	125	175	233				
2459	2265	2079	1901	1731	1569	1415	1269	1131	1001	879	765	659	561	471	389	315	249	191	141	99	65	67	69	71	73	75	77	79	81	123	173	231				
2461	2267	2081	1903	1733	1571	1417	1271	1133	1003	881	767	661	563	473	391	317	251	193	143	101	103	105	107	109	111	113	115	117	119	121	171	229				
2463	2269	2083	1905	1735	1573	1419	1273	1135	1005	883	769	663	565	475	393	319	253	195	145	147	149	151	153	155	157	159	161	163	165	167	169	227				
2465	2271	2085	1907	1737	1575	1421	1275	1137	1007	885	771	665	567	477	395	321	255	197	199	201	203	205	207	209	211	213	215	217	219	221	223	285				
2467	2273	2087	1909	1739	1577	1423	1277	1139	1009	887	773	667	569	479	397	323	257	259	261	263	265	267	269	271	273	275	277	279	281	283	285	287				
2469	2275	2089	1911	1741	1579	1425	1279	1141	1011	889	775	669	571	481	399	325	327	329	331	333	335	337	339	341	343	345	347	349	351	353	355	357				
2471	2277	2091	1913	1743	1581	1427	1281	1143	1013	891	777	671	573	483	401	403	405	407	409	411	413	415	417	419	421	423	425	427	429	431	433	435				
2473	2279	2093	1915	1745	1583	1429	1283	1145	1015	893	779	673	575	485	487	489	491	493	495	497	499	501	503	505	507	509	511	513	515	517	519	521				
2475	2281	2095	1917	1747	1585	1431	1285	1147	1017	895	781	675	577	487	579	581	583	585	587	589	591	593	595	597	599	601	603	605	607	609	611	613	615			
2477	2283	2097	1919	1749	1587	1433	1287	1149	1019	897	783	677	579	489	681	683	685	687	689	691	693	695	697	699	701	703	705	707	709	711	713	715	717			
2479	2285	2099	1921	1751	1589	1435	1289	1151	1021	899	785	681	581	491	793	795	797	799	801	803	805	807	809	811	813	815	817	819	821	823	825	827				
2481	2287	2101	1923	1753	1591	1437	1291	1153	1023	901	787	683	583	493	903	905	907	909	911	913	915	917	919	921	923	925	927	929	931	933	935	937	939	941	943	945
2483	2289	2103	1925	1755	1593	1439	1293	1155	1025	1027	1029	1031	1033	1035	1037	1039	1041	1043	1045	1047	1049	1051	1053	1055	1057	1059	1061	1063	1065	1067	1069	1071				
2485	2291	2105	1927	1757	1595	1441	1295	1157	1027	1029	1031	1033	1035	1037	1039	1041	1043	1045	1047	1049	1051	1053	1055	1057	1059	1061	1063	1065	1067	1069	1071					
2487	2293	2107	1929	1759	1597	1443	1297	1159	1029	1031	1033	1035	1037	1039	1041	1043	1045	1047	1049	1051	1053	1055	1057	1059	1061	1063	1065	1067	1069	1071						
2489	2295	2109	1931	1761	1599	1445	1447	1449	1451	1453	1455	1457	1459	1461	1463	1465	1467	1469	1471	1473	1475	1477	1479	1481	1483	1485	1487	1489	1491	1493	1495	1497				
2491	2297	2111	1933	1763	1601	1603	1605	1607	1609	1611	1613	1615	1617	1619	1621	1623	1625	1627	1629	1631	1633	1635	1637	1639	1641	1643	1645	1647	1649	1651	1653	1655				
2493	2299	2113	1935	1765	1605	1607	1609	1611	1613	1615	1617	1619	1621	1623	1625	1627	1629	1631	1633	1635	1637	1639	1641	1643	1645	1647	1649	1651	1653	1655						
2495	2301	2115	1937	1939	1941	1943	1945	1947	1949	1951	1953	1955	1957	1959	1961	1963	1965	1967	1969	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995				
2497	2303	2117	2119	2121	2123	2125	2127	2129	2131	2133	2135	2137	2139	2141	2143	2145	2147	2149	2151	2153	2155	2157	2159	2161	2163	2165	2167	2169	2171	2173	2175	2177				
2499	2305	2307	2309	2311	2313	2315	2317	2319	2321	2323	2325	2327	2329	2331	2333	2335	2337	2339	2341	2343	2345	2347	2349	2351	2353	2355	2357	2359	2361	2363	2365	2367				
2501	2503	2505	2507	2509	2511	2513	2515	2517	2519	2521	2523	2525	2527	2529	2531	2533	2535	2537	2539	2541	2543	2545	2547	2549	2551	2553	2555	2557	2559	2561	2563	2565				

6 twin prime numbers $3n^2 + 21n + 18 \pm 1$ 4 twin prime numbers $18n^2 + 252n + 1032 \pm 1$ 6 twin prime numbers $3n^2 + 69n + 198 \pm 1$

4 twin prime numbers $90n^2 + 150n + 822 \pm 1$

Figure 3.3: 270 degrees Arrangement



9 twin prime numbers
(5 twin prime numbers x twice)
 $6n^2 - 48n + 102 \pm 1$

4 twin prime numbers
 $6n^2 + 222n + 2082 \pm 1$

Figure 3.5: 60 degrees Arrangement

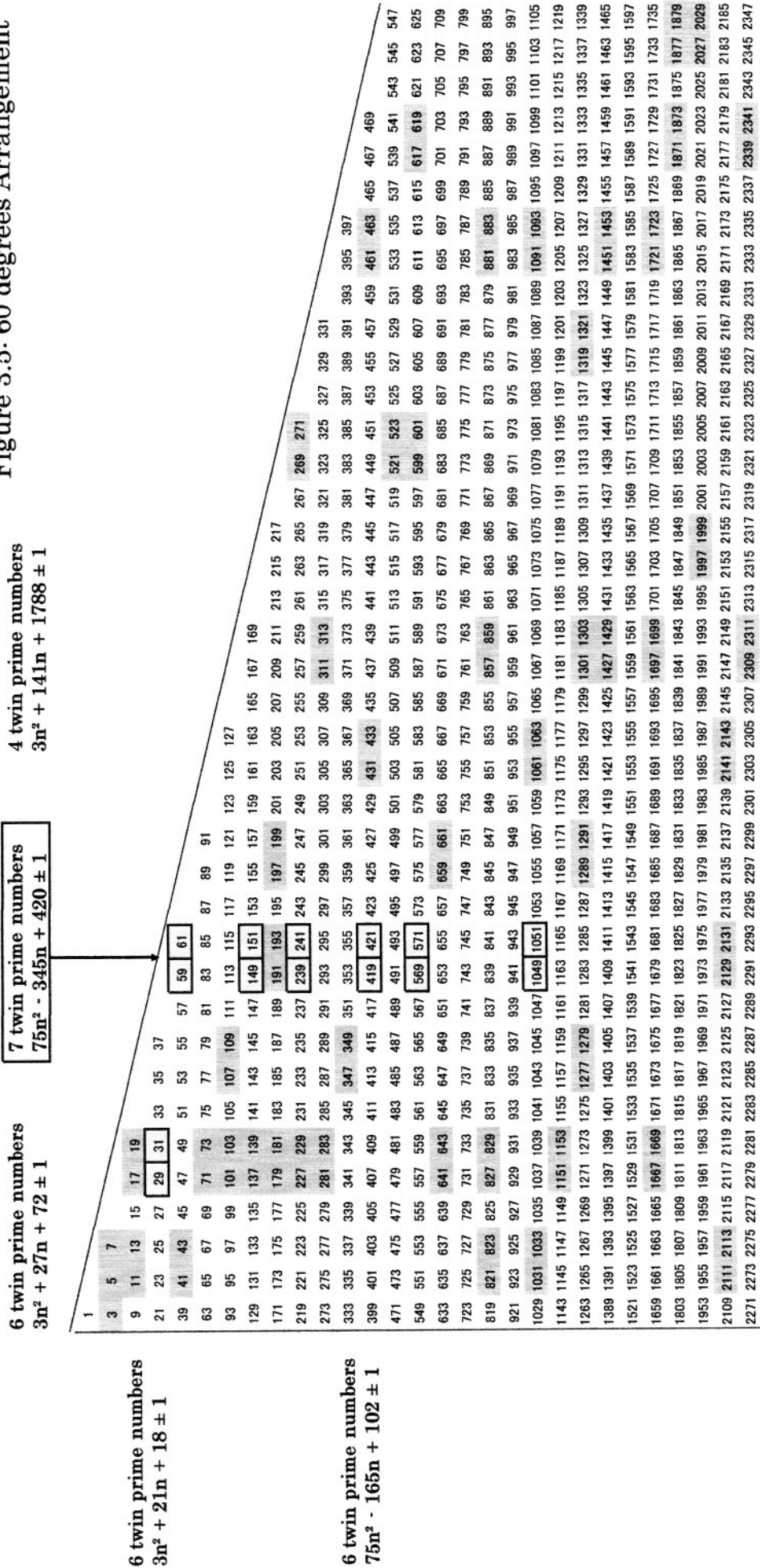
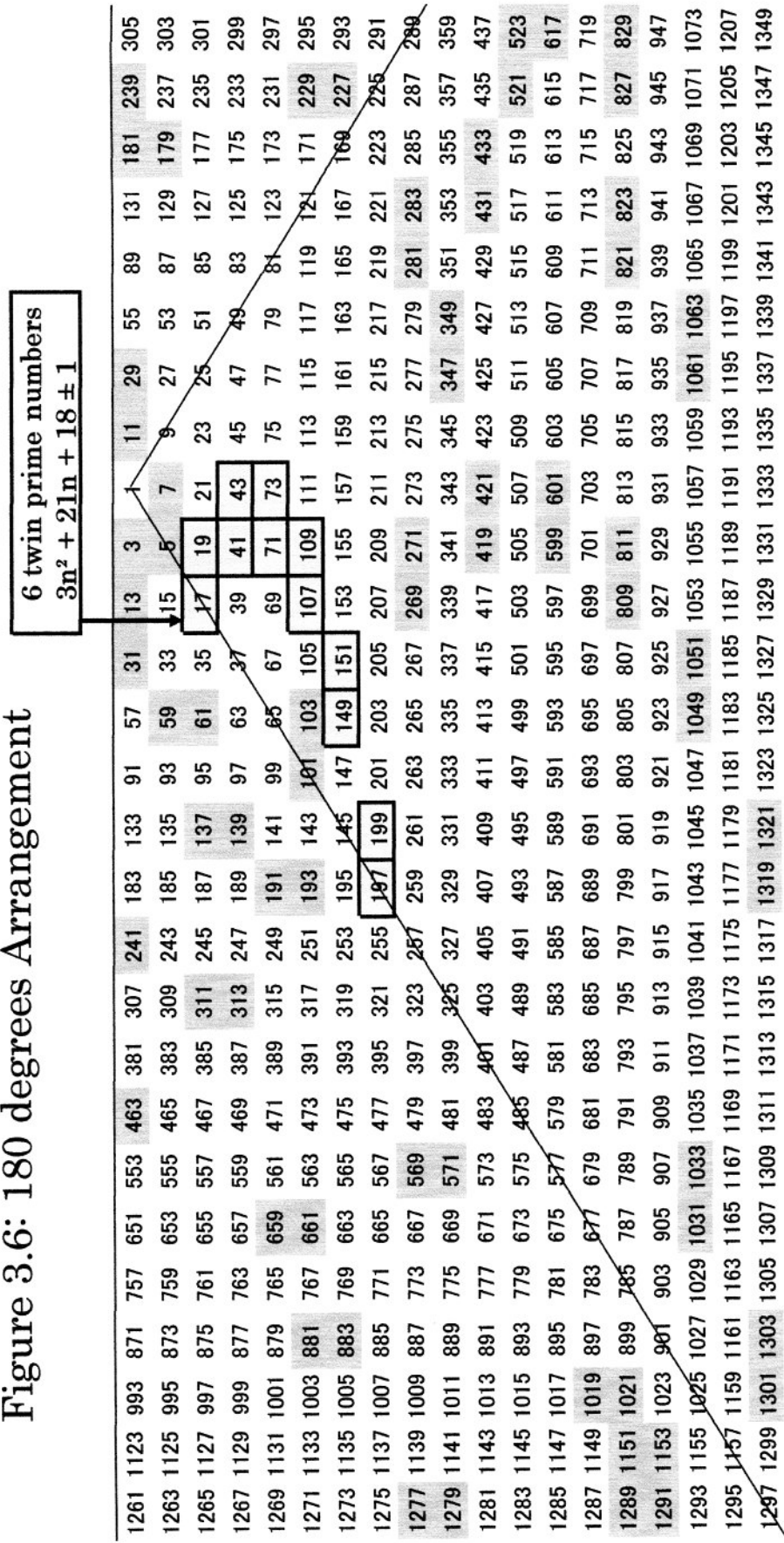


Figure 3.6: 180 degrees Arrangement



4 twin prime numbers $18n^2 + 252n + 1032 \pm 1$

4 twin prime numbers $90n^2 + 150n + 822 \pm 1$

6 twin prime numbers $3n^2 + 69n + 198 \pm 1$

Figure 3.7: 135 degrees Arrangement

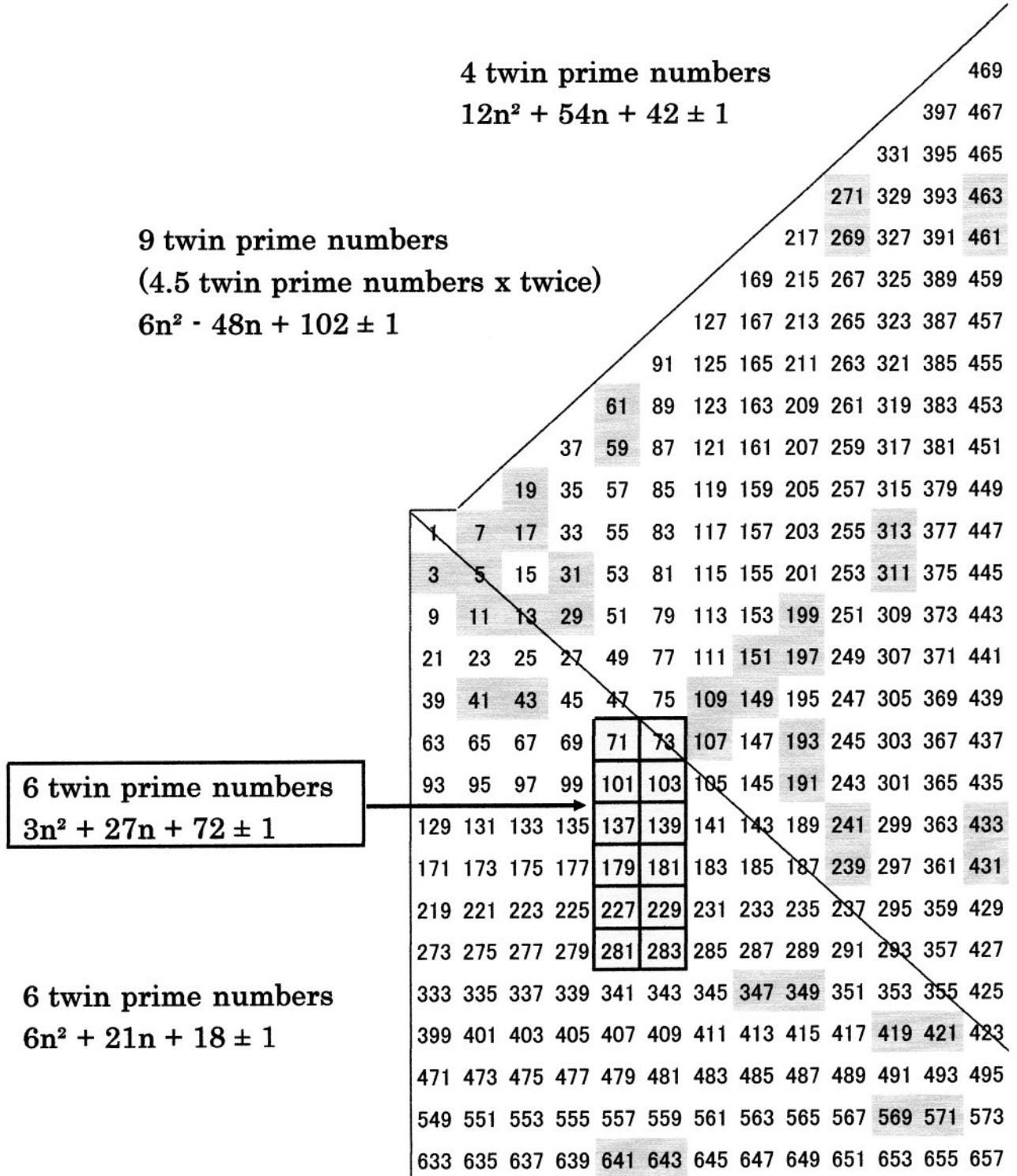
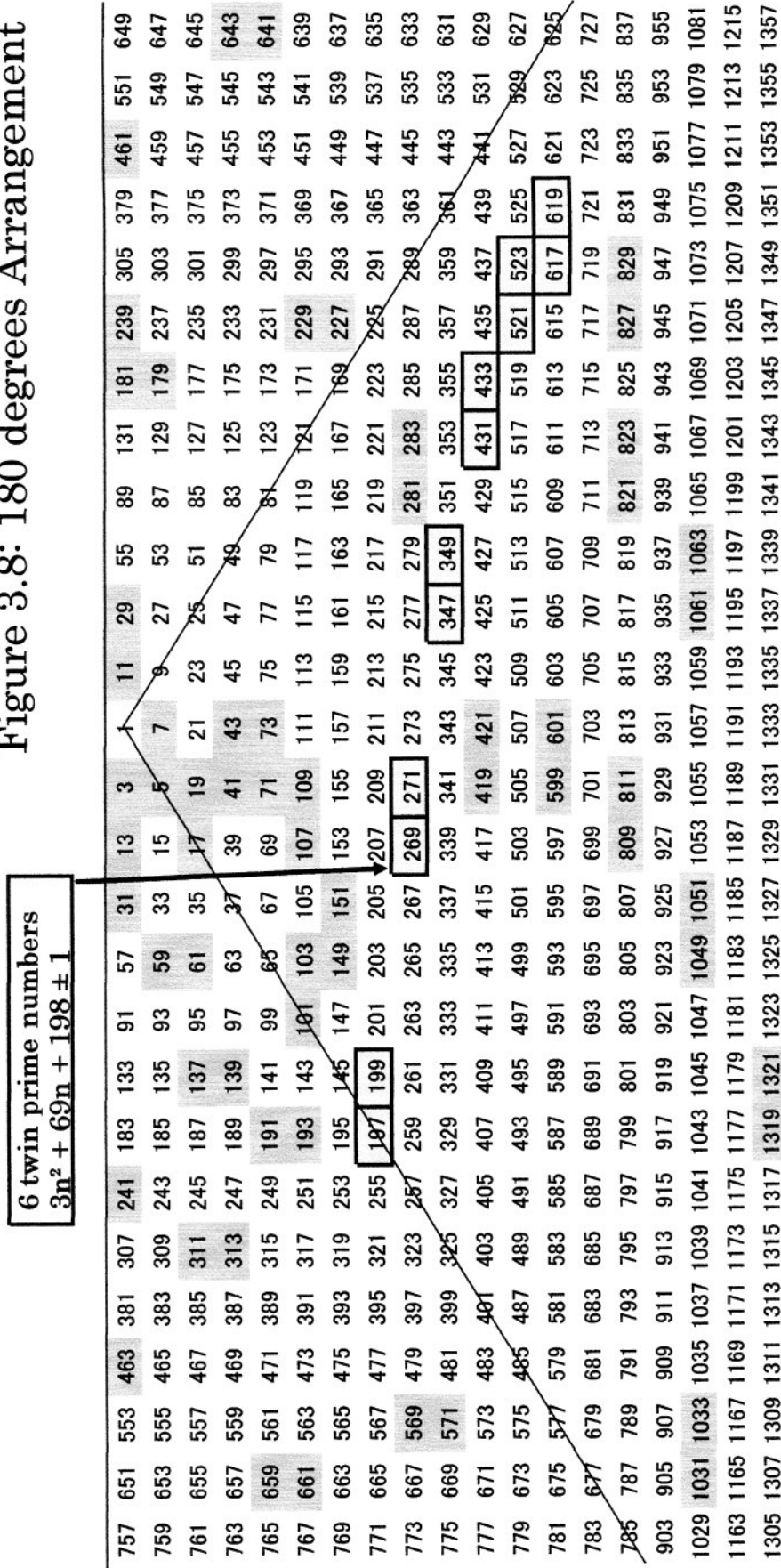


Figure 3.8: 180 degrees Arrangement



4 twin prime numbers
 $18n^2 + 252n + 1032 \pm 1$

4 twin prime numbers
 $90n^2 + 150n + 822 \pm 1$

Figure 3.9: 160 degrees Arrangement

4 twin prime numbers
 $-45n^2 + 555n + 348 \pm 1$

4 twin prime numbers
 $375n^2 - 555n + 420 \pm 1$

6 twin prime numbers
 (3 twin prime numbers x twice)
 $6n^2 - 30n + 42 \pm 1$

6 twin prime numbers
 $3n^2 + 69n + 198 \pm 1$

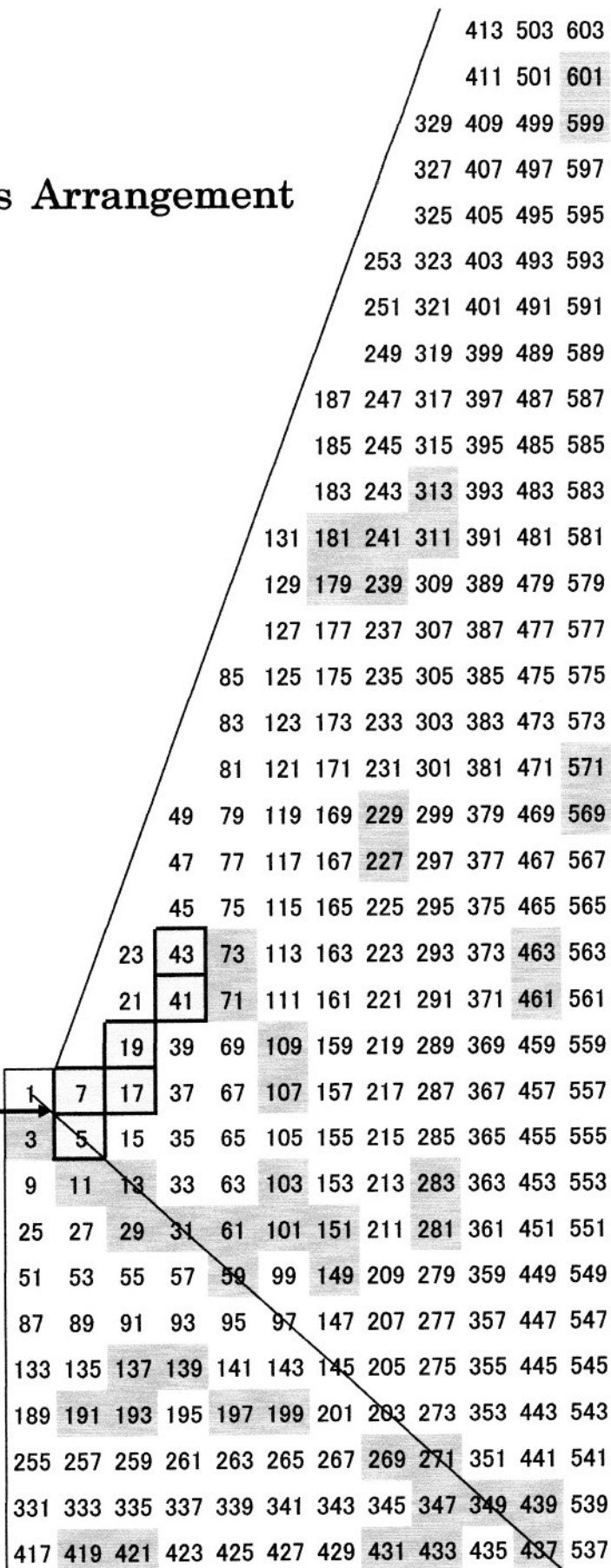


Figure 3.10: 60 degrees Arrangement

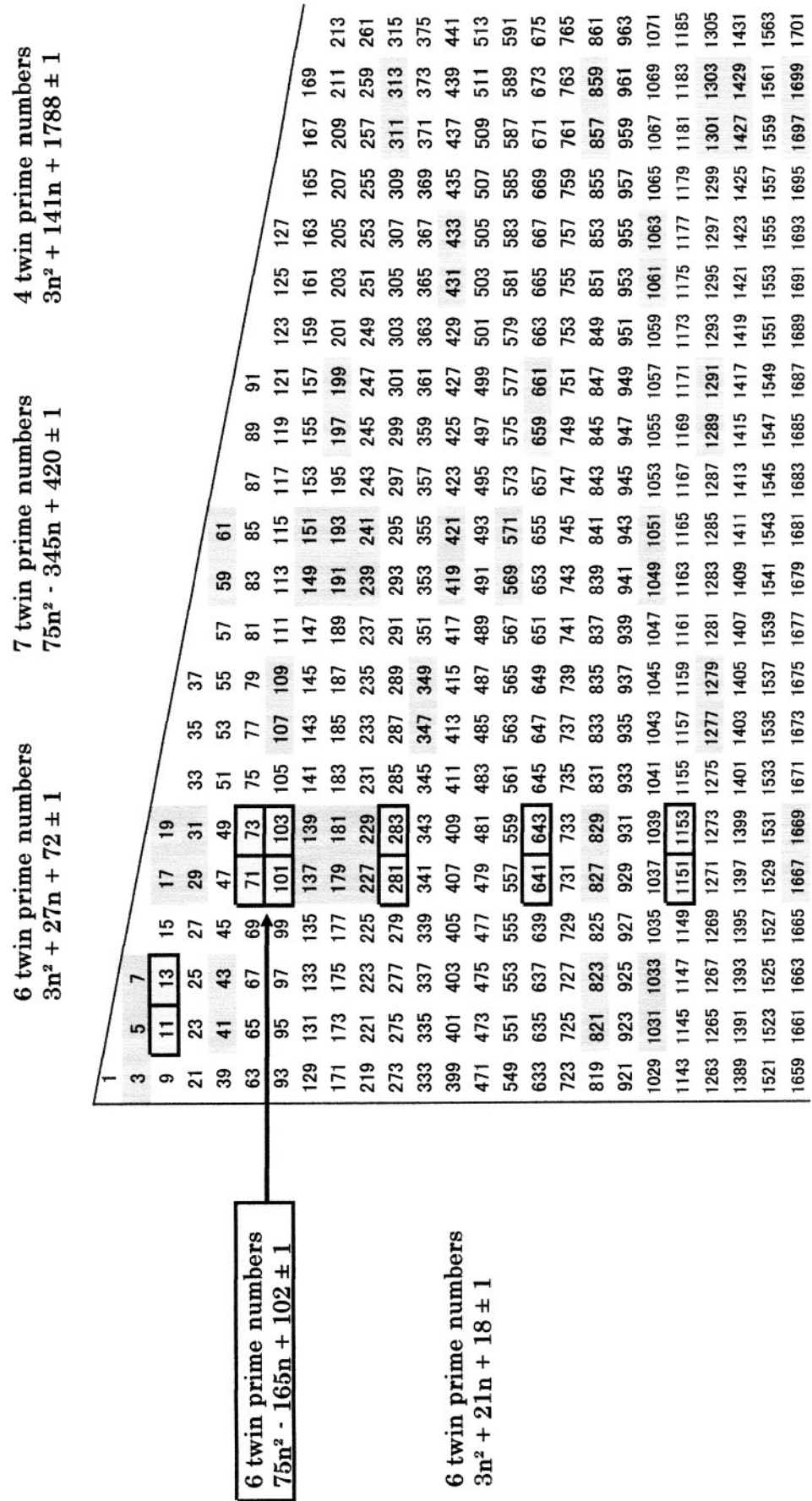


Figure 3.11: 225 degrees Arrangement

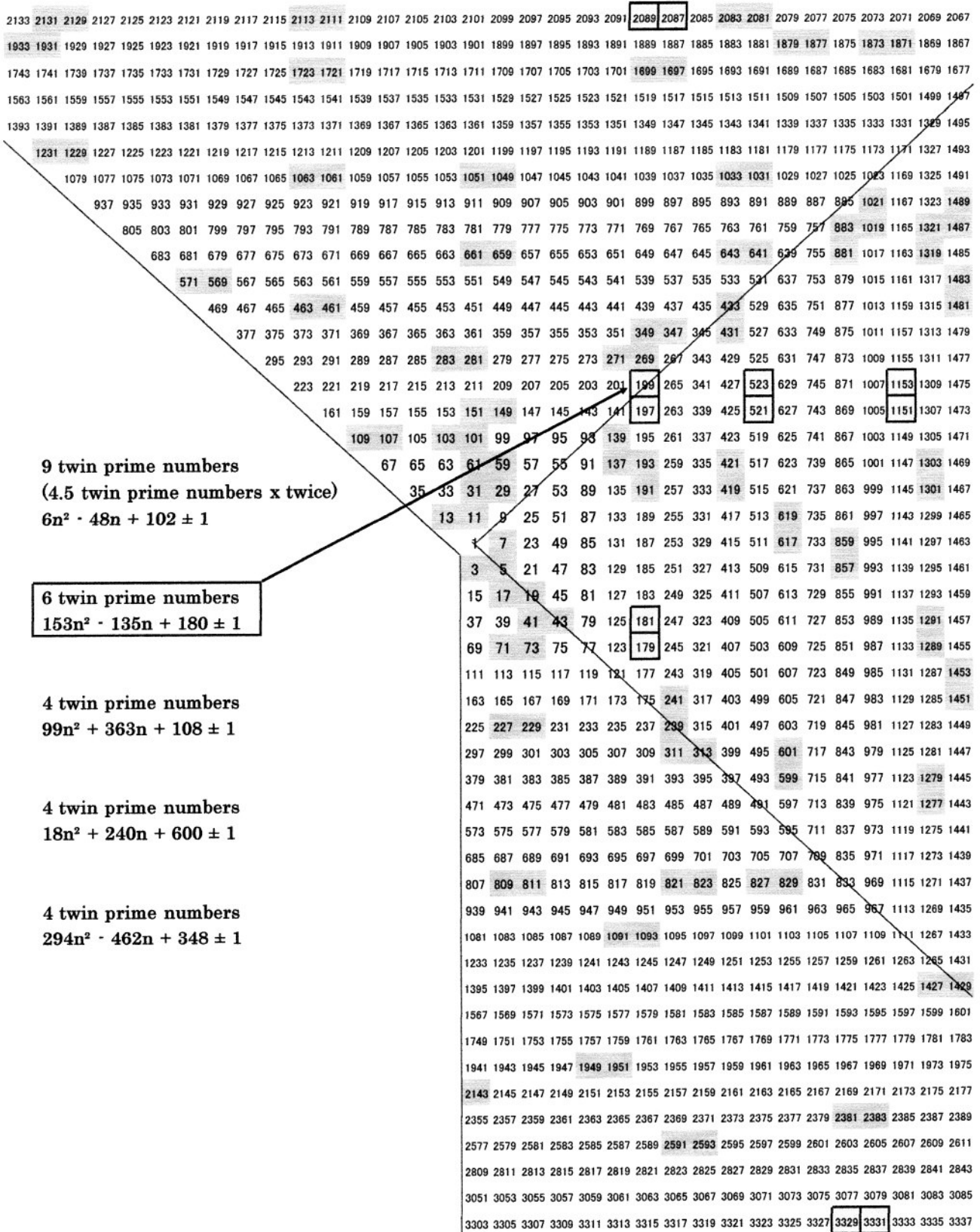


Figure 3.12: 360 degrees Arrangement

5 twin prime numbers
 $288n^2 - 180n + 30 \pm 1$

4 twin prime numbers
 $33n^2 + 519n + 1998 \pm 1$

5869	5443	5033	4639	4261	3899	3553	3223	2909	2611	2329	2063	1813	1579	1361	1159	973	803	649	647	645	643	641	639	637	635	633	631	629	627	625	623	621	
5871	5445	5035	4641	4263	3901	3555	3225	2911	2613	2331	2065	1815	1581	1363	1161	975	805	651	513	509	507	505	503	501	499	497	495	493	491	489	487		
5873	5447	5037	4643	4265	3903	3557	3227	2913	2615	2333	2067	1817	1583	1365	1163	977	807	653	515	393	391	389	387	385	383	381	379	377	375	373	371	369	
5875	5449	5039	4645	4267	3905	3559	3229	2915	2617	2335	2069	1819	1585	1367	1165	979	809	655	517	395	289	287	285	283	281	279	277	275	273	271	269	267	
5877	5451	5041	4647	4269	3907	3561	3231	2917	2619	2337	2071	1821	1587	1369	1167	981	811	657	519	397	291	289	199	197	195	193	191	189	187	185	183	181	
5879	5453	5043	4649	4271	3909	3563	3233	2919	2621	2339	2073	1823	1589	1371	1169	983	813	659	521	399	293	293	203	129	127	125	123	121	119	117	115	113	179
5881	5455	5045	4651	4273	3911	3565	3235	2921	2623	2341	2075	1825	1591	1373	1171	985	815	661	523	401	295	205	131	73	71	69	67	65	63	61	111	177	
5883	5457	5047	4653	4275	3913	3567	3237	2923	2625	2343	2077	1827	1593	1375	1173	987	817	663	525	403	297	207	133	75	33	31	29	27	25	59	109	175	
5885	5459	5049	4655	4277	3915	3569	3239	2925	2627	2345	2079	1829	1595	1377	1175	989	819	665	527	405	299	209	135	77	35	9	7	5	23	57	107	173	
5887	5461	5051	4657	4279	3917	3571	3241	2927	2629	2347	2081	1831	1597	1379	1177	991	821	667	529	407	301	211	137	79	37	11	9	21	55	105	171		
5889	5463	5053	4659	4281	3919	3573	3243	2929	2631	2349	2083	1833	1599	1381	1179	993	823	669	531	409	303	213	139	81	39	13	15	17	49	53	103	169	
5891	5465	5055	4661	4283	3921	3575	3245	2931	2633	2351	2085	1835	1601	1383	1181	995	825	671	533	411	305	215	141	83	41	43	45	47	49	51	101	167	
5893	5467	5057	4663	4285	3923	3577	3247	2933	2635	2353	2087	1837	1603	1385	1183	997	827	673	535	413	307	217	143	85	87	89	91	93	95	97	99	165	
5895	5469	5059	4665	4287	3925	3579	3249	2935	2637	2355	2089	1839	1605	1387	1185	999	829	675	537	415	309	219	145	147	149	151	153	155	157	159	161	163	
5897	5471	5061	4667	4289	3927	3581	3251	2937	2639	2357	2091	1841	1607	1389	1187	1001	831	677	539	417	311	221	223	225	227	229	231	233	235	237	239	241	
5899	5473	5063	4669	4291	3929	3583	3253	2939	2641	2359	2093	1843	1609	1391	1189	1003	833	679	541	419	313	315	317	319	321	323	325	327	329	331	333	335	
5901	5475	5065	4671	4293	3931	3585	3255	2941	2643	2361	2095	1845	1611	1393	1191	1005	835	681	543	421	315	317	319	321	323	325	327	329	331	333	335		
5903	5477	5067	4673	4295	3933	3587	3257	2943	2645	2363	2097	1847	1613	1395	1193	1007	837	683	545	423	317	319	321	323	325	327	329	331	333	335	337	339	

5 Consideration

It is expected that polynomials generating twin prime numbers may be found by devising other arrangements or by arranging up to large odd numbers by the method described in this research work etc..

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