2019 In Numbers

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*This short paper brings representations of 2019 in different situations. These representations are of **crazy-type, running numbers, single digit, single letter, Triangular, Fibonacci, palindromic-type, prime numbers, embedded, repeated, magic squares**, etc.*

H A P P Y - 2 0 1 9

*Formed by 51 **pan diagonal magic squares** of order 4 using consecutive numbers from 1 to 816 with equal magic squares sums, $S_{4\times4} := 1634$.*

http://bit.ly/2QF3XtI

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Contents

1 Crazy Representations

1.1 Single Digit and Letter

- **Single Digit Representations**

$$
\begin{aligned}
\textbf{2019} :=& 1 + (1+1)^{11} - (11-1) \times (1+1+1) \\
:=& (2 \times 22 + 2/2)^2 - 2 - 2 - 2 \\
:=& 3 + (3+3) \times (333 + 3) \\
:=& 4 + (4+4) \times (4^4 - 4) - 4/4 \\
:=& 5 + 5^5 - 5555/5 \\
:=& (6 \times (666 + 6) + 6) \times 6/(6+6) \\
:=& (77 - 7)/7 + 7 \times (7 \times (7 \times 7 - 7) - 7) \\
:=& 88 + (8+8) \times (8 \times (8+8) - 8) + 88/8 \\
:=& 9 + (9999 - 9)/9 + 9 \times 99 + 9.
\end{aligned}
$$

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- **Single Letter Representation**

$$
\textbf{2019} := \frac{\dfrac{(aaaaa - a) \times (a + a)}{aa} - a}{a}
$$

or,

$$
\textbf{2019} := \frac{(aaaaa - a) \times (a + a) - a \times aa}{a \times aa}
$$
$$
:= \frac{(aaaaa - a) \times (a + a)}{a \times aa} - \frac{a}{a}.
$$

$$
\begin{aligned}
\text{where,}\quad aaaaa &= a10^4 + a10^3 + a10^2 + a10 + a, \\
aa &= a10 + a, \ a \in \{1,2,3,4,5,6,7,8,9\}.
\end{aligned}
$$

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1.2   1 to 9 Numbers: Increasing and Decreasing

- **Basic Operations**

$$2019 := 1 + 2 \times 34 + 5 \times 6 \times (7 \times 8 + 9)$$
$$:= 98 + 7 + 65 + 43^2 \times 1.$$

- **Factorial**

$$2019 := (1 + 2) \times (3!! - 4! - 5 + 6 - 7 - 8 - 9)$$
$$:= 9 + (8 + 7) \times (6!/5 - 4 - 3 - 2 - 1).$$

- **Square-Root**

$$2019 := = -1 \times (2 + 3) + \sqrt{4^{5+6}} - 7 - 8 - 9$$
$$:= \sqrt{9} + 8 - 7 + 65 \times \left(4 + 3^{2+1}\right).$$

- **Fibonacci Sequence**

$$2019 := 12 \times F(3) \times F(4) \times 5 + F(F(6)) \times (7 + 8 \times 9)$$
$$:= F(9) \times 8 \times 7 + 65 + (4 + 3)^2 + 1$$

- **Triangular Numbers**

$$2019 := 1 - 2 + T(3)^4 + 56 - 7 + T(T(8)) + 9$$
$$:= (9 + 8 + 7) \times 6 \times (5 \times 4 - T(3)) + 2 + 1.$$

(19-3)

1.3   Numbers 1 to 10: Increasing and Decreasing

- **Numbers 1 to 10: Increasing and Decreasing**

$$2019 := (1 + 2) \times 3 + (45 + 67 + 89) \times 10$$
$$:= 10 \times (-9 + (8 + 7) \times (-6 + 5 \times 4)) + 3 \times (2 + 1).$$

(19-4)

1.4   Same Digits in Bases and Powers

• **Same Digits in Bases and Powers**

$$2019 := 2^9 + 3^7 + 7^2 - 9^3$$
$$:= 0^3 + 1^8 + 2^7 - 3^9 + 4^6 + 5^4 + 6^2 + 7^5 + 8^1 + 9^0.$$

(19-5)

2   Power Representations

• **Power 2**

$$2019 := 1^2 + 13^2 + 43^2 \quad = 5^2 + 25^2 + 37^2$$
$$:= 7^2 + 11^2 + 43^2 \quad = 7^2 + 17^2 + 41^2$$
$$:= 11^2 + 23^2 + 37^2 \quad = 13^2 + 25^2 + 35^2$$
$$:= 17^2 + 19^2 + 37^2.$$

$$2019 := 17^2 + 23^2 + 24^2 + 25^2$$
$$:= 15^2 + 17^2 + 20^2 + 23^2 + 24^2$$
$$:= 15^2 + 16^2 + 17^2 + 18^2 + 21^2 + 22^2.$$

• **Power 3**

$$2019 := 1^3 + 1^3 + 7^3 + 7^3 + 11^3$$

• **Power 4**

$$2019 := 1^4 + 2^4 + 3^4 + 5^4 + 6^4.$$

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- **Sequential Powers of 2**

$$2019 := 2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 - 2^3 - 2^2 - 2^1 + 2^0.$$

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- **Symmetric**

$$2019 := 15^2 + 28^2 + 1^2 + 28^2 + 15^2$$
$$:= 1^3 + 7^3 + 11^3 + 7^3 + 1^3.$$

- **Prime Multiplications**

$$2017 := 1 \times 2017 \rightarrow 1 \text{ times prime number}$$
$$2018 := 2 \times 1009 \rightarrow 2 \text{ times prime number}$$
$$2019 := 3 \times 673 \quad \rightarrow 3 \text{ times prime number.}$$

- **Pythagorean Triples**

$$2017^2 := 792^2 + 1855^2$$
$$2018^2 := 1118^2 + 1680^2$$
$$2019^2 := 1155^2 + 1656^2$$
$$2020^2 := 400^2 + 1980^2 \quad = 868^2 + 1824^2$$
$$:= 1212^2 + 1616^2 = 1344^2 + 1508^2.$$

(19-8)

• Pattern with Power 4

$$0\,2019 := 1^4 + 2^4 + 3^4 + 5^4 + 6^4$$
$$1\,2019 := 1^4 + 2^4 + 3^4 + 5^4 + 6^4 + 10^4$$
$$2\,2019 := 4^4 + 5^4 + 7^4 + 8^4 + 11^4$$
$$3\,2019 := 1^4 + 5^4 + 8^4 + 9^4 + 12^4$$
$$4\,2019 := 3^4 + 9^4 + 11^4 + 12^4$$
$$5\,2019 := 1^4 + 2^4 + 3^4 + 6^4 + 15^4$$
$$:= 3^4 + 9^4 + 10^4 + 11^4 + 12^4$$
$$6\,2019 := 7^4 + 9^4 + 11^4 + 14^4$$
$$7\,2019 := 4^4 + 7^4 + 8^4 + 11^4 + 15^4$$
$$:= 7^4 + 9^4 + 10^4 + 11^4 + 14^4$$
$$8\,2019 := 1^4 + 8^4 + 9^4 + 12^4 + 15^4$$
$$9\,2019 := 2^4 + 5^4 + 6^4 + 9^4 + 17^4.$$

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3 Same Digits Equality Expressions

- **Same Digits Equality Expressions**

$$21 \times 10095 = 105 \times 2019$$
$$192 \times 4038 = 384 \times 2019$$
$$219 \times 4038 = 438 \times 2019$$
$$129 \times 7403 = 473 \times 2019$$
$$1902 \times 4038 = 2019 \times 3804$$
$$39 \times 203919 = 2019 \times 3939$$
$$1992 \times 4038 = 2019 \times 3984$$
$$2199 \times 4038 = 2019 \times 4398$$
$$39 \times 224109 = 2019 \times 4329$$
$$103 \times 92874 = 2019 \times 4738$$
$$129 \times 74703 = 2019 \times 4773$$
$$104 \times 92874 = 2019 \times 4784$$
$$106 \times 92874 = 2019 \times 4876$$

http://bit.ly/2ndFyO6

19-10

- **Power and Plus**

$$\mathbf{2019} := 1^6 + 44^2 + 75^0 + 81^1 = 16 + 442 + 750 + 811.$$

http://bit.ly/2PRrfw3
http://bit.ly/2PQIE86

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• **Factorial and Power**

$$10 \times 2019 + 0 := (1! + 5! + 6!) \times 4! + 3! \qquad = 1^4 + 5^3 + 6^5 + 4^6 \times 3^1$$
$$:= 3! + 4! \times (1! + 5! + 6!) \qquad = 3^1 \times 4^6 + 1^4 + 5^3 + 6^5$$
$$10 \times 2019 + 2 := (1! + 6! + 5!) \times 4! + 2! + 3! = 1^6 + 6^2 + (5^4 + 4^1) \times 2^5 + 3^3$$
$$:= 2! + 4! \times (1! + 6! + 5!) + 3! = 2^5 \times 4^3 \times 1^6 + 6^4 \times (5^1 + 3^2)$$
$$10 \times 2019 + 6 := (1! + 5! + 6!) \times 4! + 2! \times 3! = (1^5 + 5^2) \times 6^3 + (4^1 + 2^4) \times 3^6$$
$$:= 2! \times 3! + (1! + 5! + 6!) \times 4! = 2^1 + 3^6 \times (1^4 + 5^2) + 6^3 + 4^5.$$

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• **Fibonacci and Triangular**

$$2019 := F(4) \times (F(1) + F(8) \times (F(9) - F(3))) \quad = (T(4) - T(1) + T(8)) \times T(9) - T(3)$$
$$:= ((-F(3) + F(9)) \times F(8) + F(1)) \times F(4) = -T(3) + T(9) \times T(8) - T(1) + T(4)).$$

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4 Selfie and Equivalent Fractions

• **Selfie Fractions**

$$\frac{2019}{673} := \frac{201 + 9}{67 + 3} = \frac{201 - 9}{67 - 3} = \frac{20 \times 1 \times 9}{6 \times (7 + 3)}$$

$$\frac{2019}{5384} := \frac{20 \times 1 \times 9}{5 \times 3 \times 8 \times 4}$$

$$\frac{2019}{367458} := \frac{2 \times 01 \times 9}{(3 + 6) \times 7 \times 4 \times (5 + 8)}$$
$$:= \frac{2 \times (01 + 9)}{(3 + 67) \times 4 \times (5 + 8)}.$$

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- **Equivalent Fractions**

$$\frac{\mathbf{2019}}{\mathbf{367458}} = \frac{1509}{274638} = \frac{1794}{326508} = \frac{1896}{345072} = \frac{1908}{347256} = \frac{1962}{357084}$$
$$= \frac{2097}{381654} = \frac{2973}{541086} = \frac{3018}{549276} = \frac{4056}{738192} = \frac{5043}{917826}$$
$$= \frac{5046}{918372} = \frac{5103}{928746} = \frac{5301}{964782}.$$

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http://bit.ly/2NvMiCC.

5 Fibonacci and Triangular Type Representations

- **Running-Type**

$$\mathbf{2019} := 1 + 2 + T(3 + 4 \times T(5)) = T(6) \times T(7) + T(8 + T(9))$$
$$:= -6 + (F(F(7)) - 8) \times 9$$
$$:= 9 \times (-8 + F(F(7))) - 6 = 5^4 \times 3 + F(2 + 10).$$

- **Partial Sums**

$$\mathbf{2019} := 12 \times 34 \times 5 - T(6) \qquad = 654 \times 3 + 2 + T(10)$$
$$= 654 \times 3 + 2 + F(10)$$
$$:= 4 + T(56 + 7) + 8 - 9 \quad = -T(9 + 8) - T(7) + T(65) + T(T(4))$$
$$:= 1 + 2 + T(3 + 4 \times T(5)) = T(T(5) \times 4 + 3) + 2 + 1$$
$$:= 12 \times 34 \times 5 - F(F(6)) \quad = -6 + (5 \times F(4) \times 3)^2 \times 1$$
$$:= 4 + 5 + 67 \times (F(8) + 9) \quad = -T(9 + 8) - T(7) + T(65) + T(T(4)).$$

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http://bit.ly/2LDuSlN
http://bit.ly/2AfpCli.

6 Upside Down, Mirror Looking and Symmetric

6.1 Upside Down with Digits 1, 6 and 9

• Upside Down with Digits 1, 6 and 9

$$\mathbf{2019} := 1 + 1 + 11 + 1961 + (1 + 1 + 1) \times (6 + 9)$$
$$:= 1 + 1 + 1 + 6 + 9 + 69 \times (1 + 1 + 1 + 11 + 6 + 9)$$
$$:= 1 + 1 + 1 + 6 + 9 + 96 + (1 + 1 + 1) \times (619 + 6 + 1 + 9).$$

$$1+1+11+1961+(1+1+1)x(6+9)$$

$$1+1+1+6+9+69x(1+1+1+11+6+9)$$

$$1+1+1+6+9+96+(1+1+1)x(6+1+9+619)$$

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6.2 Upside Down with Digits 0, 1, 6 and 9

• Upside Down with Digits 0, 1, 6 and 9

$$\mathbf{2019} := 9 + 1001 + 1 + 1 + 1001 + 6$$
$$:= 9 + 69 + 609 + 619 + 1 + 1 + 609 + 96 + 6$$
$$:= 1 + 1 + 609 + (1 + 1) \times (1 + 6 + 9 + 69 + 619)$$

$$9+1001+1+1+1001+6$$

$$9+69+609+1+619+1+609+96+6$$

$$1+1+609+(1+1)x(1+6+9+69+619)$$

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6.3   Symmetric, Upside Down and Mirror Looking

- **Symmetric, Upside Down and Mirror Looking**

$$\textbf{2019} := 8 + 1001 + 1 + 1001 + 8$$
$$:= 502 + 502 + 11 + 502 + 502$$
$$:= 2 + 1 + 5 + 1001 + 1 + 1001 + 5 + 1 + 2$$

=: 2019 :=

8+1001+1+1001+8

502+502+11+502+502

2+1+5+1001+1+1001+5+1+2

In the mirror, 2 becomes 5 and 5 becomes 2

19-19

7   Functional Representations

7.1   Fibonacci Sequences

- **Fibonacci Sequence Representation**

$$F(0) = F(1) = 1, \; F(n) = F(n-1) + F(n-2), \; n \geq 2,$$
$$0, 1, 1, 2, 3, 5, 8, 13, ..$$

Then,

$$\textbf{2019} := F(4) + F(6) + F(9) + F(14) + F(17).$$

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7.2 Polygonal-Type: S-gonal

• Polygonal-Type: S-gonal Representations

The general formula for *s-sides of a polygon* (**s-gonal**) is known as

$$P_s(n) := \frac{n(n-1)(s-2)}{2} + n, \ \ s > 2.$$

Below are particular cases:

Triangle (3-gonal): $P_3(n) = n(n+1)/2 \ \rightarrow \ \mathbf{2019} := P_3(2) + P_3(63) \qquad := T(2) + T(63)$

Square (4-gonal): $P_4(n) = n^2 \qquad\qquad \rightarrow \ \mathbf{2019} := P_4(1) + P_4(13) + P_4(43) := Q(1) + Q(13) + Q(43)$

Pentagonal (5-gonal): $P_5(n) = n(3n-1)/2 \rightarrow \ \mathbf{2019} := P_5(1) + P_5(8) + P_5(36) \ := P(1) + P(8) + P(36)$

Hexagonal (6-gonal): $P_6(n) = n(2n-1) \ \ \rightarrow \ \mathbf{2019} := P_6(7) + P_6(19) + P_6(25) := H(7) + H(19) + H(25).$

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http://bit.ly/2KtOCI6
http://bit.ly/2AEfntK.

8 Embedded Palindromic Primes

8.1 Embedded Palprimes With Digits 2, 0, 1 and 9

• Embedded Palprimes With Digits 2, 0, 1 and 9

120191021

11201910211

9112019102119

9219112019102119129

12921911201910211912921

90212921911201910211912921209

90190212921911201910211912921209109

99290190212921911201910211912921209109299

9192992901902129219112019102119129212091092992919

92291929929019021292191120191021191292120910929929192919229

92219229192992901902129219112019102119129212091092992919229192291229

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(19-22)

http://bit.ly/2LNE63H
http://bit.ly/2KzKHcJ.

• **Embedded Palprimes With Digits 2, 0, 1 and 9**

910212019
1191021201911
1021191021201911201
102102119102120191120201
99102102119102120191120120199
999102102119102120191120120199
100299910210211910212019112012019992001
12111100299910210211910212019112012019992001121
121121111002999102102119102120191120120199920011121121
1291211211110029991021021191021201911201201999200111121121921
92112912112111002999102102119102120191120120199920011112112192112929
929921129121121111002999102102119102120191120120199920011112112192112929
· · ·   · · ·   · · ·   · · ·   · · ·   · · ·

(19-23)

• **Embedded Palprimes With Digits 2, 0, 1 and 9**

12019291021
10112019291021101
1101120192910211011
10211011201929102110112012091
190210211011201929102110112012091
119119021021101120192910211011201201921
99119119021021101120192910211012012091191199
9929911911902102110112019291021101120120911911992992991
19929929911911902102110112019291021101120120911911992992991
90211992992991191190210211011201929102110112012091191199299299111209
1091902111992992991191190210211011201929102110112012091191199299299111209011
9021109190211199299299119119021021101120192910211011201209119119929929911120919011209
· · ·   · · ·   · · ·   · · ·   · · ·   · · ·

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- **Embedded Palprimes With Digits 2, 0, 1 and 9**

19102920191

911910292019119

992911910292019119299

120199291191029201911929910211919091099

191120199291191029201911929910211919091099

909191120199291191029201911929910211919091909

990190919112019929119102920191192991021191909109

992990190919112019929119102920191192991021191909109929912099

902199299019091911201992911910292019119299102119190910992991209

990219929901909191120199291191029201911929910211919091099929912099

90199021992990190919112019929119102920191192991021191909109929912099109

990290199021992990190919112019929119102920191192991021191909109992991209919092099

$\cdots$ $\cdots$ $\cdots$ $\cdots$ $\cdots$ $\cdots$

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8.2 Palprimes with 2019

Palprimes with 2019

120191021	12019291021	79102320197	91025952019
910212019	19102620191	79102520197	91026562019
910242019	19102920191	91020402019	91027972019
910272019	39102120193	91020502019	91028482019
	39102720193	91025752019	99102420199.

*There are much more **palprimes** with 2019, but only few are written.*

(19-26)

9   Magic Squares Type Embedded Palprimes

- **Magic Squares Type Embedded Palprimes**

7	9	9	1	1	1	9	9	7
9	1	0	2	1	2	0	1	9
9	0	7	4	1	4	7	0	9
1	2	4	5	1	5	4	2	1
1	1	1	1	9	1	1	1	1
1	2	4	5	1	5	4	2	1
9	0	7	4	1	4	7	0	9
9	1	0	2	1	2	0	1	9
7	9	9	1	1	1	9	9	7

Palprimes in rows, columns and principal diagonals.

- **Embedded Palprimes Property**

111191111

907414709 124515421 111191111 124515421 907414709

910212019 907414709 124515421 111191111 124515421 907414709 910212019

799111997 910212019 907414709 124515421 111191111 124515421 907414709 910212019 799111997

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http://bit.ly/2wvJ6jc
http://bit.ly/2LEGuEY.

• **Magic Squares Type Embedded Palprimes**

9	7	9	9	3	9	9	7	9
7	5	1	7	0	7	1	5	7
9	1	0	2	1	2	0	1	9
9	7	2	1	6	1	2	7	9
3	0	1	6	8	6	1	0	3
9	7	2	1	6	1	2	7	9
9	1	0	2	1	2	0	1	9
7	5	1	7	0	7	1	5	7
9	7	9	9	3	9	9	7	9

Palprimes in rows, columns and principal diagonals.

• **Embedded Palprime Property**

301686103

972161279 3016861039 72161279

910212019 972161279 3016861039 72161279 910212019

979939979 751707157 910212019 972161279 3016861039 72161279 910212019 751707157 979939979

• Magic Squares Type Embedded Palprimes

1	9	9	1	7	1	9	9	1
9	1	0	2	4	2	0	1	9
9	0	7	9	9	9	7	0	9
1	2	9	9	1	9	9	2	1
7	4	9	1	5	1	9	4	7
1	2	9	9	1	9	9	2	1
9	0	7	9	9	9	7	0	9
9	1	0	2	4	2	0	1	9
1	9	9	1	7	1	9	9	1

Palprimes in rows, columns and principal diagonals.

• Embedded Property

749151947

129919921 749151947 129919921

907999709 129919921 749151947 129919921 907999709

199171991 910242019 907999709 129919921 74915194 7129919921 907999709 910242019 199171991

- **Magic Squares Type Embedded Palprimes**

$$
\begin{array}{ccccccccc}
1 & 3 & 9 & 9 & 9 & 9 & 9 & 3 & 1 \\
3 & 8 & 1 & 7 & 9 & 7 & 1 & 8 & 3 \\
9 & 1 & 0 & 2 & 7 & 2 & 0 & 1 & 9 \\
9 & 7 & 2 & 6 & 1 & 6 & 2 & 7 & 9 \\
9 & 9 & 7 & 1 & 1 & 1 & 7 & 9 & 9 \\
9 & 7 & 2 & 6 & 1 & 6 & 2 & 7 & 9 \\
9 & 1 & 0 & 2 & 7 & 2 & 0 & 1 & 9 \\
3 & 8 & 1 & 7 & 9 & 7 & 1 & 8 & 3 \\
1 & 3 & 9 & 9 & 9 & 9 & 9 & 3 & 1
\end{array}
$$

Palprimes in rows, columns and principal diagonals.

- **Embedded Property**

997111799

972616279 997111799 972616279

381797183 910272019 972616279 997111799 972616279 910272019 381797183

139999931 381797183 910272019 9726162799 97111799 972616279 910272019 381797183 139999931

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10   Fixed Digits Repetitions Prime Patterns

- **Fixed Digits Repetitions Prime Pattern**

▶ 2 3833

2 2019 3833

2 2019 2019 3833

2 2019 2019 2019 3833

2 2019 2019 2019 2019 3833

2 2019 2019 2019 2019 2019 3833.

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- **Fixed Digits Repetitions Prime Pattern**

  ▶ 3 9409
    3 2019 9409
    3 2019 2019 9409
    3 2019 2019 2019 9409
    3 2019 2019 2019 2019 9409
    3 2019 2019 2019 2019 2019 9409.

    http://bit.ly/2wqeIHt
    http://bit.ly/2wELt3l.

  19-32

- **Fixed Digits Repetitions Prime Pattern**

  ▶ 8 6851
    8 2019 6851
    8 2019 2019 6851
    8 2019 2019 2019 6851
    8 2019 2019 2019 2019 6851
    8 2019 2019 2019 2019 2019 6851.

    http://bit.ly/2wqeIHt
    http://bit.ly/2wELt3l.

  19-33

- **Fixed Digits Repetitions Prime Pattern**

  ▶ 133541
    133541 2019
    133541 2019 2019
    133541 2019 2019 2019
    133541 2019 2019 2019 2019
    133541 2019 2019 2019 2019 2019.

    http://bit.ly/2wqeIHt
    http://bit.ly/2wELt3l.

  19-34

• **Fixed Digits Repetitions Prime Pattern**

$$\blacktriangleright 122\,2019$$
$$122\,252\,2019$$
$$122\,252\,252\,2019$$
$$122\,252\,252\,252\,2019$$
$$122\,252\,252\,252\,252\,2019$$
$$122\,252\,252\,252\,252\,252\,2019$$
$$122\,252\,252\,252\,252\,252\,252\,2019.$$

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http://bit.ly/2wqeIHt
http://bit.ly/2MBIeV8.

• **Fixed Digits Repetitions Prime Pattern**

$$\blacktriangleright 1570\,2019$$
$$1570\,99\,2019$$
$$1570\,99\,99\,2019$$
$$1570\,99\,99\,99\,2019$$
$$1570\,99\,99\,99\,99\,2019$$
$$1570\,99\,99\,99\,99\,99\,2019$$
$$1570\,99\,99\,99\,99\,99\,99\,2019.$$

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http://bit.ly/2wqeIHt
http://bit.ly/2MBIeV8.

• **Fixed Digits Repetitions Prime Pattern**

$$\blacktriangleright 3757\,2019$$
$$3757\,15\,2019$$
$$3757\,15\,15\,2019$$
$$3757\,15\,15\,15\,2019$$
$$3757\,15\,15\,15\,15\,2019$$
$$3757\,15\,15\,15\,15\,15\,2019$$
$$3757\,15\,15\,15\,15\,15\,15\,2019.$$

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http://bit.ly/2wqeIHt
http://bit.ly/2MBIeV8.

11   Palindromic-Type Expressions and Patterns

11.1   Palindromic-Type Expressions

$$0\,2019 \times 101 + 101 \times 9102\,0 = 0\,203919 + 919302\,0$$
$$1\,2019 \times 101 + 101 \times 9102\,1 = 1\,213919 + 919312\,1$$
$$2\,2019 \times 101 + 101 \times 9102\,2 = 2\,223919 + 919322\,2$$
$$3\,2019 \times 101 + 101 \times 9102\,3 = 3\,233919 + 919332\,3$$
$$4\,2019 \times 101 + 101 \times 9102\,4 = 4\,243919 + 919342\,4$$
$$5\,2019 \times 101 + 101 \times 9102\,5 = 5\,253919 + 919352\,5$$
$$6\,2019 \times 101 + 101 \times 9102\,6 = 6\,263919 + 919362\,6$$
$$7\,2019 \times 101 + 101 \times 9102\,7 = 7\,273919 + 919372\,7$$
$$8\,2019 \times 101 + 101 \times 9102\,8 = 8\,283919 + 919382\,8$$
$$9\,2019 \times 101 + 101 \times 9102\,9 = 9\,293919 + 919392\,9$$

(19-38)

$$10\,2019 \times 101 + 101 \times 9102\,01 = 10\,303919 + 919303\,01$$
$$11\,2019 \times 101 + 101 \times 9102\,11 = 11\,313919 + 919313\,11$$
$$12\,2019 \times 101 + 101 \times 9102\,21 = 12\,323919 + 919323\,21$$
$$13\,2019 \times 101 + 101 \times 9102\,31 = 13\,333919 + 919333\,31$$
$$14\,2019 \times 101 + 101 \times 9102\,41 = 14\,343919 + 919343\,41$$
$$15\,2019 \times 101 + 101 \times 9102\,51 = 15\,353919 + 919353\,51$$
$$16\,2019 \times 101 + 101 \times 9102\,61 = 16\,363919 + 919363\,61$$
$$17\,2019 \times 101 + 101 \times 9102\,71 = 17\,373919 + 919373\,71$$
$$18\,2019 \times 101 + 101 \times 9102\,81 = 18\,383919 + 919383\,81$$
$$19\,2019 \times 101 + 101 \times 9102\,91 = 19\,393919 + 919393\,91.$$

(19-39)

$$0\,2019 \times 10101 + 10101 \times 9102\,0 = 0\,20393919 + 919393302\,0$$
$$1\,2019 \times 10101 + 10101 \times 9102\,1 = 1\,21403919 + 919403312\,1$$
$$2\,2019 \times 10101 + 10101 \times 9102\,2 = 2\,22413919 + 919413322\,2$$
$$3\,2019 \times 10101 + 10101 \times 9102\,3 = 3\,23423919 + 919423332\,3$$
$$4\,2019 \times 10101 + 10101 \times 9102\,4 = 4\,24433919 + 919433342\,4$$
$$5\,2019 \times 10101 + 10101 \times 9102\,5 = 5\,25443919 + 919443352\,5$$
$$6\,2019 \times 10101 + 10101 \times 9102\,6 = 6\,26453919 + 919453362\,6$$
$$7\,2019 \times 10101 + 10101 \times 9102\,7 = 7\,27463919 + 919463372\,7$$
$$8\,2019 \times 10101 + 10101 \times 9102\,8 = 8\,28473919 + 919473382\,8$$
$$9\,2019 \times 10101 + 10101 \times 9102\,9 = 9\,29483919 + 919483392\,9$$

19-40

$$10\,2019 \times 10101 + 10101 \times 9102\,01 = 10\,30493919 + 919393403\,01$$
$$11\,2019 \times 10101 + 10101 \times 9102\,11 = 11\,31503919 + 919404413\,11$$
$$12\,2019 \times 10101 + 10101 \times 9102\,21 = 12\,32513919 + 919414423\,21$$
$$13\,2019 \times 10101 + 10101 \times 9102\,31 = 13\,33523919 + 919424433\,31$$
$$14\,2019 \times 10101 + 10101 \times 9102\,41 = 14\,34533919 + 919434443\,41$$
$$15\,2019 \times 10101 + 10101 \times 9102\,51 = 15\,35543919 + 919444453\,51$$
$$16\,2019 \times 10101 + 10101 \times 9102\,61 = 16\,36553919 + 919454463\,61$$
$$17\,2019 \times 10101 + 10101 \times 9102\,71 = 17\,37563919 + 919464473\,71$$
$$18\,2019 \times 10101 + 10101 \times 9102\,81 = 18\,38573919 + 919474483\,81$$
$$19\,2019 \times 10101 + 10101 \times 9102\,91 = 19\,39583919 + 919484493\,91$$

19-41

11.2   Palindromic-Type Patterns

$$2019 \times 101 + 101 \times 9102 = 203919 + 919302 := 1123221$$
$$2019 \times 10101 + 10101 \times 9102 = 20393919 + 91939302 := 112333221$$
$$2019 \times 1010101 + 1010101 \times 9102 = 2039393919 + 9193939302 := 11233333221$$
$$2019 \times 101010101 + 101010101 \times 9102 = 203939393919 + 919393939302 := 1123333333221$$

(19-42)

http://bit.ly/2vBzRxt
http://bit.ly/2vCuYEk

$$2019 \times 10001 + 10001 \times 9102 = 20192019 + 91029102 := 111221121$$
$$2019 \times 100001 + 100001 \times 9102 = 201902019 + 910209102 := 1112111121$$
$$2019 \times 1000001 + 1000001 \times 9102 = 2019002019 + 9102009102 := 11121011121$$
$$2019 \times 10000001 + 10000001 \times 9102 = 20190002019 + 91020009102 := 111210011121$$

(19-43)

http://bit.ly/2vBzRxt
http://http://bit.ly/2vmiqRY

12   Magic Squares

12.1   Upside Down Magic Square of Order 4

Upside Down Magic Square with Digits 2, 0, 1 and 9

The above magic square is of magic sum, $S_{4\times4} := 132$ with digits 2, 0, 1 and 9. 180° rotation give again a magic square with digits 2, 0, 1 and 6 with magic sum, $S_{4\times4} := 99$.

19-44

https://arxiv.org/abs/1005.1384
https://arxiv.org/abs/1010.2083
https://arxiv.org/abs/1010.4186

12.2   Upside Down Magic Square of Order 5

• Upside Down Magic Square with 2019

00	99	22	11	66
12	61	06	90	29
96	20	19	62	01
69	02	91	26	10
21	16	60	09	92

The above magic square of order 5 is of magic sum 198 with digits 2, 0, 1, 6 and 9. 180° rotation give again a magic square with same digits and same magic sum, $S_{5\times5} := 198$. Moreover, it is pan diagonal magic square of order 5. This magic sum can also be written as upside down by writing as

$$198 = 99 + 66 + 22 + 11$$

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(19-45)

https://arxiv.org/abs/1005.1384
https://arxiv.org/abs/1010.2083
https://arxiv.org/abs/1010.4186

12.3 Equal Sums Magic Squares of Order 4

- **Equal Sums Magic Squares of Order 4**

*Formed by 51 **pan diagonal magic squares** of order 4 using consecutive numbers from 1 to 816 with equal magic squares sums, $S_{4\times4} := 1634$.*

(19-46)

http://bit.ly/2QF3XtI

References

1. **I.J. TANEJA**, Crazy Representations of Natural Numbers, Selfie Numbers, Fibonacci Sequence, and Selfie Fractions, RGMIA Research Report Collection, **19**(2016), Article 179, pp.1-37, *http://rgmia.org/papers/v19/v19a179.pdf*; *http://bit.ly/2Q7ie0v*.

2. **I.J. TANEJA**, Crazy, Selfie, Fibonacci, Triangular, Amicable Types Representations of Numbers, RGMIA Research Report Collection, **21**(2018), Art. 3, pp. 1-140, *http://rgmia.org/papers/v21/v21a03.pdf*; *http://bit.ly/2OKNh2S*

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