Mathematical Aspects of July - 2017

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Inder J. Taneja[1]

Abstract

Some days appearing in the month of July this year was very interesting from mathematical point of view. This short work brings mathematical aspects based on these days, considering as ***prime day***, ***palindromic days***, ***approximate value of*** π ***day***, *etc. Connections are made with prime patterns, magic squares, crazy, single digit, single letters representations, magic-square-type palprimes, etc.*

Contents

[1] *Formerly, Professor of Mathematics, Universidade Federal de Santa Catarina, 88.040-900 Florianópolis, SC, Brazil.* ***E-mail: ijtaneja@gmail.com; Web-site: http://inderjtaneja.com***

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1 Introduction

This year during month of July, there are very interesting dates from point of view. There are only two examples, with two digits day, such as 7.7.17 and 17.7.17. Writing as numbers we have **7717** and **17717**. Out of these the 7717 is prime, while second is 17717 not a prime number. Then comes day 10. Writing as american style 7.10.2017 or **7102017** becomes a palindromic number. Again writing american style the sequence of numbers from 7.11.17 to 7.19.17, i.e., **71117** to **71917** are 9 palindromes. Out of these 9, there are two numbers **71317** and **71919** are palindromic prime (palprime) numbers. The days July 12 and 21 give us same digits day, where each digit repeats twice, i.e., **12072017** and **21072017**. The day July 22 is approximate **Pi** (π) day, i.e., **22/7**. Finally comes the day July 29, i.e, 29-17 or **1729** is a famous Hardy-Ramanujan number. This work brings some curiosities from mathematical point of view on the numbers specified above. See below

2 July, 7

There are many days in July that give prime numbers such as: $2, 3, 5, 7, 11, 13, 17, 19, 23, 29$. Out of these there is only one number 7 that give prime day, i.e., 7.7.17 or simply 7717, where the numbers: **7 - 17 - 7717 - 7177 - 1777** are prime numbers. The date 17.7.17 is not a prime number, but it has two digits 1 and 7 as of 7.7.17. Even though 17717 is not a prime number, but the subsection below give prime patterns with these two numbers.

2.1 Prime Patterns with 7717 and 17717

Prime Patterns With 7717

3985 7717
99 **3985 7717**
99 99 **3985 7717**
99 99 99 **3985 7717**
99 99 99 99 **3985 7717**
99 99 99 99 99 **3985 7717**
99 99 99 99 99 99 **3985 7717**.

4 899 7717
4 45 **899 7717**
4 45 45 **899 7717**
4 45 45 45 **899 7717**
4 45 45 45 45 **899 7717**
4 45 45 45 45 45 **899 7717**
4 45 45 45 45 45 45 **899 7717**.

5 32 **7717**
5 597 32 **7717**
5 597 597 32 **7717**
5 597 597 597 32 **7717**
5 597 597 597 597 32 **7717**
5 597 597 597 597 597 32 **7717**
5 597 597 597 597 597 597 32 **7717**.

73 36 **7717**
73 60 36 **7717**
73 60 60 36 **7717**
73 60 60 60 36 **7717**
73 60 60 60 60 36 **7717**
73 60 60 60 60 60 36 **7717**
73 60 60 60 60 60 60 36 **7717**.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/PquvOe*; (ii) *https://goo.gl/rPyzjr*; (iii) *https://goo.gl/1FwzLc*; (iv) *https://goo.gl/oW9EB6*; (v) *https://goo.gl/WbgsJE*.

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Prime Patterns With 17717 and 7717

722 287
722 7 **17717** 287
722 7 **17717** 7 **17717** 287
722 7 **17717** 7 **17717** 7 **17717** 287
722 7 **17717** 7 **17717** 7 **17717** 7 **17717** 287
722 7 **17717** 7 **17717** 7 **17717** 7 **17717** 7 **17717** 287
722 7 **17717** 7 **17717** 7 **17717** 7 **17717** 7 **17717** 7 **17717** 287

722 287
722 71 **7717** 287
722 71 **7717** 71 **7717** 287
722 71 **7717** 71 **7717** 71 **7717** 287
722 71 **7717** 71 **7717** 71 **7717** 71 **7717** 287
722 71 **7717** 71 **7717** 71 **7717** 71 **7717** 71 **7717** 287
722 71 **7717** 71 **7717** 71 **7717** 71 **7717** 71 **7717** 71 **7717** 287

Both the patterns are with same prime numbers, but the difference is only in representations.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/PquvOe*; (ii) *https://goo.gl/rPyzjr*; (iii) *https://goo.gl/1FwzLc*; (iv) *https://goo.gl/oW9EB6*; (v) *https://goo.gl/WbgsJE*.

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2.2 Crazy Representations

This subsection brings representations of numbers 7717 and 17717 in terms of 1 to 9 and reverse i.e., 9 to 1. In the decreasing order 9 to 0 is also considered in some cases. These representations are with basic operations as well as using Fibonacci sequence numbers.

Crazy Representations of 7717

$$\begin{aligned}\mathbf{7717} &:= -12+3+4+(5+6)\times 78\times 9\\ &:== 98\times 7\times 6+(5\times 4\times 3)^2+1.\end{aligned}$$

$$\begin{aligned}\mathbf{7717} &:= 1+2-3+(F(F(4))-5)^{F(6)}+(F(7)+F(8))\times F(9)\\ &:= -F(9)-8-F(7)+6^5-4+3-2-1\\ &:= -9\times 8+F(7)+6^5+4\times 3-2-10.\end{aligned}$$

where F is Fibonacci sequence number.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/DSqYVs*; (ii) *https://goo.gl/ZF0JZ3*; (iii) *https://goo.gl/qEPB1V*.

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Crazy Representations of 17717

$$\begin{aligned}\mathbf{17717} &:= 1\times 2+(3+4\times 56)\times 78+9\\ &:= 98\times(7+6^5)/43-21.\end{aligned}$$

$$\begin{aligned}\mathbf{17717} &:= 1+2-3+F(F(4))-5+F(F(F(6))-7+8)+9\\ &:= 9+F(87-65)-F(4)+3-2-1\\ &:= F(-F(9)+8\times 7)+6+5+4+3-2-10.\end{aligned}$$

where F is Fibonacci sequence number.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/DSqYVs*; (ii) *https://goo.gl/ZF0JZ3*; (iii) *https://goo.gl/qEPB1V*.

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2.3 Selfie Representations in terms of Fibonacci Values

The number 17717 is written in digit's order and reverse using Fibonacci sequence values. Still we don't have similar kind of relation for 7717.

Selfie Representations of 17717 in terms of Fibonacci Values

$$\begin{aligned}\mathbf{17717} &:= F(1+F(F(-7+F(7))))-1+7\\ &:= 7-1+F(F(F(-7+F(7)))+1).\end{aligned}$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/ETctFz*;(ii) *https://goo.gl/3f3zub*; (iii) *https://goo.gl/MxAjXh*.

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2.4 Single Digit Representations

The numbers 7717 and 17717 can be written in terms of single digits 1, 2, 3, 4, 5, 6, 7, 8 and 9. See below:

Single Digit Representations of 7717

$$\textbf{7717} := (1+1+1)\times(1+111)\times(1+11+11)-11 = 2+2+(22^2-2)\times 2^{2+2}+\frac{2}{2}$$

$$:= (3+3\times 3)^3+\frac{33^3-3}{3+3} \qquad = 4\times(44\times 44-4)-\frac{44}{4}$$

$$:= \left(5+\frac{5}{5}\right)^5+\frac{5}{5}-5-55 \qquad = 6+\frac{6+6^6}{6}-66$$

$$:= 7777-7\times 7-\frac{77}{7} \qquad = 88\times 88-8-8-\frac{88}{8}$$

$$:= \left(99-\frac{99}{9}\right)^{\left(\frac{9+9}{9}\right)}-9-9-9.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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Single Digit Representations of 17717

$$\textbf{17717} = 1+1+\frac{1+1+1+(1+1+1)^{11}}{11-1} \qquad = 2+2+2+22+\left(22+\frac{222}{2}\right)^2$$

$$= 33+3\times(3+33)+\left(3^3-\frac{3}{3}\right)^3 \qquad = 4+4\times(4444-4\times 4)+\frac{4}{4}$$

$$= 5+\left(5+\frac{55}{5}\right)\times\left(\frac{5+5555}{5}-5\right) \qquad = 6+6\times(6+6)\times(6\times(6+6\times 6)-6)-\frac{6}{6}$$

$$= 7+7\times\left(7\times 7\times 7+\left(\frac{7+7+7}{7}\right)^7\right) \qquad = 8\times((8+88)\times(8+8+8)-88)-\frac{88}{8}$$

$$= 9+(9+9)\times(999-9)-\frac{9+999}{9}.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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2.5 Single Letter Representations

The numbers 7717 and 17717 can be written in terms of single letter "a", where

$$a \in \{1,2,3,4,5,6,7,8,9\}.$$

See below:

Single Letter Representations of 7717 and 17717

$$\mathbf{7717} := \frac{\frac{(aaaa-aa+a+a)\times(aa-a-a-a-a)}{a}+a+a+a}{a}$$

$$\mathbf{17717} := \frac{(aaa+aa+a)\times(aa+a)\times(aa+a)}{a\times a\times a}+\frac{aa-a}{a+a}.$$

where

$$a \in \{1,2,3,4,5,6,7,8,9\}$$

$$aa := a\times 10+a,\quad aaa := a\times 10^2+a\times 10+a,\quad \text{etc.}$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/8kQsS4*
(ii) *https://goo.gl/xYvcY5*

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3 July, 10

Writing july 10 in american style, we have palindromic number as 7.10.2017, i.e., 7102017. Below are some embedded palindromic prime patterns of this number using only the digits 0, 1, 2 and 7. All other numbers except 7102017 are prime numbers.

3.1 Embedded Palindromic Prime Patterns

Embedded Palindromic Prime Patterns With 7102017

7102017	**7102017**
7 **7102017** 7	7 **7102017** 7
1207 **7102017** 7021	1027 **7102017** 7201
1001207 **7102017** 7021001	1021027 **7102017** 7201201

Except first 7102017 all others are prime numbers.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

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4 July, 11-19

From July 11 to July 19, writing in american style, we have 9 palindromic numbers in a sequence, such as, 71117 to 71917. See following subsections for interesting results.

4.1 Palindromic Magic Square

See a magic square of order 3×3 with these numbers:

9-Palindromic Days of July (American Style)

71117	71417	71717
71217	71517	71817
71317	71617	71917

Palindromic Magic Square of Order 3×3

			214551
71417	**71917**	**71217**	*214551*
71317	**71517**	**71717**	*214551*
71817	**71117**	**71617**	*214551*
214551	*214551*	*214551*	*214551*

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/n3mhe5*;(ii) *https://goo.gl/yzcRWa*;
(iii) *https://goo.gl/DE1iyK*; (iv) *https://goo.gl/rzJYuG*.

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4.2 Prime Patterns

Prime Patterns With 71117 to 71917

► 11 **71117**
11 555 **71117**
11 555 555 **71117**
11 555 555 555 **71117**
11 555 555 555 555 **71117**
11 555 555 555 555 555 **71117**

► 1 71217 3
759 1 **71217** 3
759 759 1 **71217** 3
759 759 759 1 **71217** 3
759 759 759 759 1 **71217** 3
759 759 759 759 759 1 **71217** 3

► 71317
7131 606912 **7**
7131 606912 606912 **7**
7131 606912 606912 606912 **7**
7131 606912 606912 606912 606912 **7**
7131 606912 606912 606912 606912 606912 **7**

► 15 71417
15 51 **71417**
15 51 51 **71417**
15 51 51 51 **71417**
15 51 51 51 51 **71417**
15 51 51 51 51 51 **71417**

► 4 71517 7
4 71517 909 **7**
4 71517 909 909 **7**
4 71517 909 909 909 **7**
4 71517 909 909 909 909 **7**
4 71517 909 909 909 909 909 **7**

► 71617 73
71617 207 **73**
71617 207 207 **73**
71617 207 207 207 **73**
71617 207 207 207 207 **73**
71617 207 207 207 207 207 **73**

► 5 6 71717
5 51 **6 71717**
5 51 51 **6 71717**
5 51 51 51 **6 71717**
5 51 51 51 51 **6 71717**
5 51 51 51 51 51 **6 71717**

► 34 71817
168 **34 71817**
168 168 **34 71817**
168 168 168 **34 71817**
168 168 168 168 **34 71817**
168 168 168 168 168 **34 71817**

► 60 71917
60 555 **71917**
60 555 555 **71917**
60 555 555 555 **71917**
60 555 555 555 555 **71917**
60 555 555 555 555 555 **71917**

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/PquvOe*; (ii) *https://goo.gl/rPyzjr*;
(iii) *https://goo.gl/1FwzLc*; (iv) *https://goo.gl/oW9EB6*;
(v) *https://goo.gl/WbgsJE*.

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4.3 Magic-Square-Type Palindromic Prime Numbers

Magic-Square-Type Palindromic Prime Numbers With 71117 to 71917

199393991	977373779	111191111	711797117	319191913
974090479	755676557	100030001	151545151	148444841
948979849	755676557	119585911	117070711	980979089
309515903	366212663	12**7131**721	750515057	149919941
99**7111**799	77**7121**777	987212789	94**7141**749	94**7151**749
309515903	366212663	12**7131**721	750515057	149919941
948979849	755676557	119585911	117070711	980979089
974090479	755676557	100030001	151545151	148444841
199393991	977373779	111191111	711797117	319191913

337171733	991737199	799939997	919797919
359838953	943131349	935595539	176111671
798797897	133575331	957797759	96**7191**769
18**7161**781	715818517	95**7181**759	711616117
739606937	33**7171**733	399878993	919171919
18**7161**781	715818517	95**7181**759	711616117
798797897	133575331	957797759	96**7191**769
359838953	943131349	935595539	176111671
337171733	991737199	799939997	919797919

Note: *Palindromic prime numbers in rows, columns and principal diagonals with embedded property, known by* ***Magic-Square-Type Palprimes***

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/Vv1v3G*;
(ii) *https://goo.gl/62syas*;
(iii)*https://goo.gl/9tsBH0*.

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4.4 Embedded Palprimes

Below are embedded palindromic prime patterns with numbers 71317 and 71917. In case of 71317, only the digits 1, 3 and 7 are used, while in case of 71917, only the digits 1, 7 and 9 are used.

Embedded Palindromic Prime Patterns With 71317 and 71917

71317
711 **71317** 117
171711 **71317** 117171
3171711 **71317** 1171713
1113171711 **71317** 1171713111

71317
711 **71317** 117
33711 **71317** 11733
7733711 **71317** 1173377
77733711 **71317** 11733777

71917
777 **71917** 777
171777 **71917** 777171
77171777 **71917** 77717177
177171777 **71917** 777171771

71917
777 **71917** 777
911777 **71917** 777119
99911777 **71917** 77711999
1999911777 **71917** 7771199991

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

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4.5 Complimentary Embedded Palprime Patterns

Below are embedded palindromic prime patterns written in such a way that if we change 3 by 9 or vice-versa, even then they remains palindromic prime patterns.

Complimentary Embedded Palindromic Prime Patterns With 71317 and 71917

131
71317
777 **71317** 777
111117777 **71317** 777711111
1111111111117777 **71317** 77771111111111111

191
71917
777 **71917** 777
111117777 **71917** 777711111
1111111111117777 **71917** 77771111111111111

131
71317
777 **71317** 777
117777777 **71317** 777777711
11111111111117777777 **71317** 777777711111111111111

191
71917
777 **71917** 777
117777777 **71917** 777777711
11111111111117777777 **71917** 777777711111111111111

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

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4.6 Crazy Representations

This subsection brings crazy representations of the numbers 71117 to 71917 are written in increasing and decreasing orders of 1 to 9. In case of decreasing orders the representations from 9 to 0 are also given. Along with basic operations, triangular sequence numbers are also used. Since there are many numbers we have divided in three subparts.

Crazy Representations of 71117 to 71317

$$\begin{aligned}\mathbf{71117} &:= 1+2\times 3-T(T(4)\times T(5))-T(T(6))+T(T(T(7)))+T(8)+9\\ &:= -T(9)+T(-T(8)+T(T(7)))+T(6)\times T(T(5))+(4+3)\times(2-1)\\ &:= 9+8+7+T(6+T(5))\times T(T(T(4)))/(3+2)-T(10)\end{aligned}$$

$$\begin{aligned}\mathbf{71217} &:= 1^2\times(3+4)-T(5)-T(T(6)+7)+T(T(T(8)-9))\\ &:= T(T(-9+T(8)))-T(7+T(6))-T(5)+(4+3)\times(2-1)\\ &:= 9-8+7-T(T(6))+(-T(T(5))+4+T(T(T(3+2))))\times 10\end{aligned}$$

$$\begin{aligned}\mathbf{71317} &:= 1+2\times 3+T(4)\times(T(T(T(5)))-6-78-T(9))\\ &:= T(T(T(9))-T(T(8)))-(T(7)-T(T(6)))\times T(5)+(4+3)\times(2-1)\\ &:= 9+8+7+T(T(6))+T(T(T(5)))\times(4+T(3))+2-T(T(10)).\end{aligned}$$

where T is triangular sequence number.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/DSqYVs*; (ii) *https://goo.gl/ZF0JZ3*; (iii) *https://goo.gl/qEPB1V*.

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Crazy Representations of 71417 to 71617

$$\begin{aligned}\mathbf{71417} &:= 1^2\times(3+4)-5+(T(T(6)-7)-T(8))\times T(T(9))\\ &:= -T(T(9))\times(T(8)-T(-7+T(6)))-5+(4+3)\times(2-1)\\ &:= -T(T(9))\times(T(8)-T(-7+T(6)))-5+(4+3)\times(2-1).\end{aligned}$$

$$\begin{aligned}\mathbf{71517} &:= 1+2\times 3-T(T(4)+5)+6-7+T(T(T(8)-9))\\ &:= T(T(-9+T(8)))-7+6-T(T(5))+(4+3)\times(2-1)\\ &:= T(T(T(T(9))-T(8)\times T(7)))+6-T(T(5))+4\times 3-2-10.\end{aligned}$$

$$\begin{aligned}\mathbf{71617} &:= 1+2\times 3-T(4+T(5)-6-7)+T(T(T(8)-9))\\ &:= (9+T(T(8))+7)\times T(6)\times 5+(4+3)\times(2-1)\\ &:= 98-76+T(T((5+4)\times 3))-T(-2+10).\end{aligned}$$

where T is triangular sequence number.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/DSqYVs*; (ii) *https://goo.gl/ZF0JZ3*; (iii) *https://goo.gl/qEPB1V*.

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Crazy Representations of 71717 to 71917

$$\begin{aligned}
\mathbf{71717} &:= 1+2\times 3+T(4)\times(T(T(T(5)\times(-6+7)))-89)\\
&:= T(T(-9+T(8)))-T(7)-6+T(T(5))+4-3-2+1\\
&:= T(T(-9+T(8)))-T(7)-6+T(T(5))+4\times 3-2-10.
\end{aligned}$$

$$\begin{aligned}
\mathbf{71817} &:= 1+2\times 3-T(4)+T(56)\times(-7+8)\times T(9)\\
&:= (T(T(T(9))-T(T(8)))-T(T(T(7)))-6)\times(-5)+(4+3)\times(2-1)\\
&:= (9+T(T(8))-T(7))\times(T(T(6))-T(T(5)))+4\times 3-2-10.
\end{aligned}$$

$$\begin{aligned}
\mathbf{71917} &:= 1^2\times(3+4)+T(T(T(5))-T(6))\times 7+T(8)\times T(T(9))\\
&:= T(9)\times T(8\times 7)+6\times T(5)+(4+3)\times(2-1)\\
&:= T(T(-9+T(8)))+T(7+T(6))-T(T(5))+4\times 3-2-10.
\end{aligned}$$

where T is triangular sequence number.

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/DSqYVs*; (ii) *https://goo.gl/ZF0JZ3*; (iii) *https://goo.gl/qEPB1V*.

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4.7 Single Digit Representations

The numbers 71117 to 71917 are written in terms of single digit separately from 1 to 9. These are given below for each value separately.

Single Digit Representations of 71117

$$\begin{aligned}
\mathbf{71117} &:= 1+1+11+1111\times(1+1)^{(1+1)\times(1+1+1)} &&= 2+2\times 2^{(}2+2)\times 2222+\frac{22}{2}\\
&:= 3\times\left(3+3^3+3^{3\times 3}\right)+\frac{33^3-3}{3} &&= 4\times(4+4\times 4444)-4+\frac{4}{4}\\
&:= 5\times 5\times(5^5-5-5\times 55)-5-5+\frac{5+5}{5} &&= 6+6+\frac{\left(6+6666\times(\frac{6+6}{6})^6\right)}{6}\\
&:= \frac{7+77}{7}\times\left(77\times 77-\frac{7+7}{7}\right)-7 &&= 8\times 8888+\frac{8+8+88}{8}\\
&:= 9\times 9\times 999-99\times 99-\frac{9}{9}.
\end{aligned}$$

Inder J. Taneja – *ijtaneja@gmail.com* – *http://inderjtaneja.com* – *https://goo.gl/2L3mEk*

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Single Digit Representations of 71217

$$\mathbf{71217} := (1+1+1)\times\left(1+11\times\left(111+(1+1)^{11}-1\right)\right) = 2^{\frac{22}{2}}+(22+\left(\frac{22^2-2}{2}\right)^2$$

$$:= 3+(3+3)\times\frac{3+33^3-333}{3} \qquad = 4\times(44+4\times(4444-4))+\frac{4}{4}$$

$$:= 55555+5+5\times5^5+\left(\frac{5+5}{5}\right)^5 \qquad = 6+6\times6\times6-6^6+\frac{6+6}{6}+\left(6+\frac{6}{6}\right)^6$$

$$:= \frac{77\times(7+77\times(7+77))-7}{7}-7 \qquad = 8\times(8+8+8888)-8-8+\frac{8}{8}$$

$$:= 9+9+9\times(9\times9\times99-9-99).$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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Single Digit Representations of 71317

$$\mathbf{71317} := 1+(1+1+1)\times\left(1+11\times\left(1+1+111+(1+1)^{11}\right)\right) = 2+2+2+22+\left(\frac{22}{2}+2^{2\times(2+2)}\right)^2$$

$$= \left(3^3-\frac{3}{3}\right)\times\left(3+\frac{33}{3}\right)^3-3^3 \qquad = (4+4+4)^4+\left(4+\frac{44}{4}\right)^4-44$$

$$= \frac{5+\left(5+\frac{5^5}{5}\right)\times\left(555+\frac{55}{5}\right)}{5} \qquad = 6\times(6+6\times66\times(6\times6-6))+\frac{6}{6}$$

$$= \frac{7+(7+77)\times(7+7+77\times77)}{7} \qquad = 8+88+8\times(8+8+8888)-\frac{88}{8}$$

$$= 9+9+9+9+99\times(9\times9\times9-9)+\frac{9}{9}.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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Single Digit Representations of 71417

$$\mathbf{71417} := \frac{11\times\left((1+1+1+111)^{(1+1)}-11\right)-1}{1+1}$$

$$= \left(\frac{222}{2}-2\right)^2+\left(2+\frac{22^2}{2}\right)^2 \qquad = 3+(3\times3+33)^3-3\times33\times3^3-\frac{3}{3}$$

$$= 4\times4\times(4+4)+(4^4+\frac{44}{4})^{(\frac{4+4}{4})} \qquad = (5+5^5-5\times5)\times\left(5\times5-\frac{5+5}{5}\right)+\frac{5+5}{5}$$

$$= 6\times66\times(6+6)+66666-\frac{6}{6} \qquad = 7\times\left(7+(7+7)\times\left(\frac{7+7}{7}\right)^7\right)+\frac{7^7-7}{7+7}$$

$$= (8+8+888)\times\left(88-8-\frac{8}{8}\right)+\frac{8}{8} \qquad = 999\times(9\times9-9)-\left(\frac{9+9}{9}\right)^9+\frac{9}{9}.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk.*

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Single Digit Representations of 71517

$$\mathbf{71517} = 11 + (1+1) \times \left(11111 + (1+1) \times 111^{1+1}\right)$$

$$= 22222 + 222^2 + \frac{22}{2} \qquad = 3 + 3 \times \left(33 \times 3^{3+3} - 3 - (3+3)^3\right)$$

$$= (44-4) \times (4 \times (4+444) - 4) - 4 + \frac{4}{4} \qquad = 5 + 5 + \left(5 \times 5 - \frac{5+5}{5}\right) \times \left(5^5 - 5 - \frac{55}{5}\right)$$

$$= 6 + 66 \times \frac{6 + 6 \times (6 + 6 \times 6 \times (66-6))}{6+6} \qquad = 7 + \left(7 - \frac{7+7}{7}\right)^7 - 7 \times 7 \times \left(7 + \left(\frac{7+7}{7}\right)^7\right)$$

$$= 8 \times (8 \times 8 + 8888) - 88 - \frac{88}{8} \qquad = 9 \times (9 + 9 \times (9 \times 99 - 9)) - 9 + \frac{9+9+9}{9}.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk.*

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Single Digit Representations of 71617

$$\mathbf{71617} = 1 + (1+1) \times (1+11) \times \left((1+1)^{1+11} - 1 - 1111\right) \qquad = 2 \times 2^{2+2} \times \left(2^{2+2} + 2222\right) + \frac{2}{2}$$

$$= 3 + (3 + (3+3)^3) \times (333 - 3 - 3) + \frac{3}{3} \qquad = 4 \times 4 \times (4 \times (4+4) + 4444) + \frac{4}{4}$$

$$= \left(5^5 - \frac{55}{5}\right) \times \left(5 \times 5 - \frac{5+5}{5}\right) - 5 \qquad = 6 + \left(6 - \frac{6}{6}\right)^6 + \frac{6 \times 6^6 - 6}{6 - \frac{6}{6}}$$

$$= 7 + 77 \times \left(7 + \frac{77 \times (7+77) - 7}{7}\right) \qquad = 8 \times (8 \times 8 + 8888) + \frac{8}{8}$$

$$= \left(9 - \frac{9+9}{9}\right) \times \left(\left(\frac{9+9}{9}\right)^9 \times \left(9 + \frac{99}{9}\right) - 9\right).$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk.*

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Single Digit Representations of 71717

$$\mathbf{71717} = 1 + 1 + \left(1 + (1+1)^{11}\right) \times (1 + 1 + 11 \times (1 + 1 + 1)) \qquad = 2 + \left(\frac{2}{2} + 2^{\frac{22}{2}}\right) \times \left(2 + 22 + \frac{22}{2}\right)$$

$$= (3+3) \times \left(\frac{3 + 33^3}{3} - 3^3\right) - \frac{3}{3} \qquad = 4 + 4 \times (4 \times 4444 - 4) + \left(4 + \frac{4}{4}\right)^4$$

$$= 5 - 5 \times 5 + \left(5^5 - 5 - \frac{5}{5}\right) \times \left(5 \times 5 - \frac{5+5}{5}\right) \qquad = 6 + 6 \times 6 \times (6 + 6 + 66 \times (6 \times 6 - 6)) - \frac{6}{6}$$

$$= 7 \times 7 + \left(7 + \frac{7+77}{7}\right) \times \left(7 \times 7 \times 77 - \frac{7}{7}\right) \qquad = 8 + \left(888 + 8 \times 8 \times 88 - \frac{8}{8}\right) \times \frac{88}{8}$$

$$:= 9 + 9 \times (9 \times (9 + 9 \times 99) - 9) - \frac{9999}{9}.$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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Single Digit Representations of 71817

$$\begin{aligned}
\mathbf{71817} &= 111 \times \Big((1+1) \times ((1+1) \times (11-1-1))^{1+1} - 1\Big) \\
&= \frac{(2+2+2)^{2+2}-2}{2} \times \frac{222}{2} \\
&= \frac{555}{5} \times \frac{55+55+5^5}{5} \\
&= \left(\frac{7+7}{7} + 7 \times 7 \times 7 - 77\right)^{\left(\frac{7+7}{7}\right)} - 7 \\
&= \left(9 \times (9 \times 9 - 9) - \frac{9}{9}\right) \times \frac{999}{9}.
\end{aligned}$$

$$\begin{aligned}
&= 4 + 4 + 4 \times 4 \times (44 + 4444) + \frac{4}{4} \\
&= \frac{666}{6} \times \frac{\frac{6^6}{6+6} - 6}{6} \\
&= 8 + 8 \times (88 + 8888) + \frac{8}{8}
\end{aligned}$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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Single Digit Representations of 71917

$$\begin{aligned}
\mathbf{71917} &= (1+1) \times 11 \times \left((1+1)^{11} + 11 \times 111\right) - 1 \\
&= 222 \times \left(2 + 2^{2+2}\right)^2 - \frac{22}{2} \\
&= \left(4 + \frac{4}{4}\right) \times \left(\left(\frac{44}{4}\right)^4 - 4^4\right) - 4 - 4 \\
&= 6 \times (6+6+6) \times 666 - \frac{66}{6} \\
&= 888 \times \left(\frac{8}{8} + 88 - 8\right) - \frac{88}{8}
\end{aligned}$$

$$\begin{aligned}
&= 333 \times (3+3)^3 - \frac{33}{3} \\
&= 5 + 5 + 55 + \left(5^5 - \frac{5}{5}\right) \times \left(5 \times 5 - \frac{5+5}{5}\right) \\
&= 7 + \left(7 + 77 + \frac{7}{7}\right) \times \frac{77 \times 77 - 7}{7} \\
&= 999 \times (9 \times 9 - 9) - \frac{99}{9}.
\end{aligned}$$

Inder J. Taneja – *ijtaneja@gmail.com – http://inderjtaneja.com – https://goo.gl/2L3mEk*

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4.8 Single Letter Representations

The numbers 71117 to 71917 can be written in terms of single letter "a", where

$$a \in \{1, 2, 3, 4, 5, 6, 7, 8, 9\}.$$

See below:

Single Letter Representations of 71117 to 71917

$$71117 := \frac{\frac{\left(\frac{(aa+a)\times aa}{a+a}-a-a\right)\times aaaa}{a}+a+aa+a}{a}.$$

$$71217 := \frac{\frac{\left(\frac{(aa+a)\times aa}{a+a}-a-a\right)\times aaaa}{a}+a+aaa+a}{a}.$$

$$71317 := \frac{\frac{\left(\frac{(aa+a)\times aa}{a+a}-a-a\right)\times aaaa}{a}+a+aaa+a+aaa-aa}{a}.$$

$$71417 := \frac{\frac{(aaaaa-aaa)\times(aa+a+a)}{a+a}-aaa}{a}+\frac{aaa+a}{a+a+a+a}.$$

$$71517 := \frac{\frac{(aaaaa-aaa)\times(aa+a+a)}{a+a}+a+aa}{a}+\frac{aa-a}{a+a}.$$

$$71617 := \frac{\frac{(aaaaa-aaa)\times(aa+a+a)}{a+a}+aa+aaa}{a}-\frac{aa-a}{a+a}.$$

$$71717 := \frac{\frac{(aaaaa-aaa)\times(aa+a+a)}{a+a}+aaa+aaa}{a}-\frac{aa-a}{a+a}.$$

$$71817 := \frac{(aaa-a-a-a)\times aaa\times(aa+a)}{(a+a)\times a\times a}-\frac{aaa}{a}.$$

$$71917 := \frac{(aaa-a-a-a)\times aaa\times(aa+a)}{(a+a)\times a\times a}-\frac{aa}{a}.$$

where

$$a\in\{1,2,3,4,5,6,7,8,9\}$$

$$aa := a\times 10+a,\quad aaa := a\times 10^2+a\times 10+a,\quad \text{etc.}$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/8kQsS4*
(ii) *https://goo.gl/xYvcY5*

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5 July, 12 and 21

Same digit's days, i.e., 12.07.2017 and 21.07.2017. Both the days are having same digits, i.e., 0, 1, 2 and 7. These two days are not palindromic, but are with same digits, where each digit repeats twice. Below are equalities with same digits having these numbers.

5.1 Same Digits Equalities

Same Digits Equalities: 1207 and 2107 with 2017

$$2 \times 14\,\mathbf{1207}\,5 = 14 \times\ \mathbf{2017}\,25$$
$$5935 \times \mathbf{1207}\ \ = 355 \times \mathbf{2017}\,9$$

$$9 \times \mathbf{2107}\,48 = 94 \times \mathbf{2017}\,8$$
$$134 \times \mathbf{2107}\,7\ \ = 14 \times \mathbf{2017}\,37$$
$$335 \times \mathbf{2107}\,7\ \ = 35 \times \mathbf{2017}\,37.$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

https://goo.gl/DUWQ4o

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5.2 Prime Patterns

Prime Patterns With 1207, 2107 and 2017

75 1207	**2017** **283**
75 73482 **1207**	**2017** 699 **283**
75 73482 73482 **1207**	**2017** 699 699 **283**
75 73482 73482 73482 **1207**	**2017** 699 699 699 **283**
75 73482 73482 73482 73482 **1207**	**2017** 699 699 699 699 **283**
75 73482 73482 73482 73482 73482 **1207**	**2017** 699 699 699 699 699 **283**
75 73482 73482 73482 73482 73482 73482 **1207**	**2017** 699 699 699 699 699 699 **283**

13 5 **2107**	**2017** **039** 1
13 279 **5** **2107**	**2017** **039** 81 1
13 279 279 **5** **2107**	**2017** **039** 81 81 1
13 279 279 279 **5** **2107**	**2017** **039** 81 81 81 1
13 279 279 279 279 **5** **2107**	**2017** **039** 81 81 81 81 1
13 279 279 279 279 279 **5** **2107**	**2017** **039** 81 81 81 81 81 1
13 279 279 279 279 279 279 **5** **2107**	**2017** **039** 81 81 81 81 81 81 1

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) *https://goo.gl/PquvOe*; (ii) *https://goo.gl/rPyzjr*; (iii) *https://goo.gl/1FwzLc*; (iv) *https://goo.gl/oW9EB6*; (v) *https://goo.gl/WbgsJE*.

J29

6 July, 22

Writing as 22/7, this day give an approximate value of Pi (π). See below some of its representations.

6.1 Addable and Dottable Equivalent Fractions

Approximate Pi (π) Day: 22/7

Addable and Dottable Fractions With 22/7

$$\frac{2022}{7077}=\frac{20+22}{70+77};\quad \frac{2222}{7272}=\frac{22+22}{72+72};\quad \frac{4422}{7236}=\frac{44+22}{72+36};$$
$$\frac{2822}{7055}=\frac{28+22}{70+55};\quad \frac{5522}{7028}=\frac{55+22}{70+28};\quad \frac{6622}{7826}=\frac{66+22}{78+26}.$$

$$\frac{1222}{7238}=\frac{12\times 2+2}{7\times 2\times (3+8)};\quad \frac{1322}{7932}=\frac{(1+3)\times (2+2)}{(7+9)\times 3\times 2)};$$
$$\frac{1722}{7175}=\frac{1\times 72\times 2}{(7+1)\times 75};\quad \frac{2822}{7055}=\frac{2\times 8+22}{70+5\times 5};$$
$$\frac{2422}{7266}=\frac{2\times 4+22}{(7+2+6)\times 6};\quad \frac{4422}{7035}=\frac{4\times 4\times 22}{70\times (3+5)};$$
$$\frac{5522}{7028}=\frac{5\times 5\times 22}{70\times (2+8)};\quad \frac{6822}{7959}=\frac{6\times 8\times (2+2)}{(7+9)\times (5+9)}.$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) https://goo.gl/8atQMY; (ii) https://goo.gl/qidrGQ; (iii) https://goo.gl/8zFbq7; (iv) https://goo.gl/yf7W1q; (v) https://goo.gl/Gyj51q.

J30

7 July, 29

Writing as July 29 as 29-17 or 1729, it becomes a famous **Hardy-Ramanujan number 1729**. This year this numbers will appear 11 times, i.e., in all months except the month of February. It will happy again only in 2029. In that year it will give 12 times. See below some of its representations in terms of addable and dottable fractions.

7.1 Addable and Dottable Equivalent Fractions

Hardy-Ramanujan Number 1729

Equivalent Fractions with Basic Operations - I

On a special day: July 29, 17 (17-29)

$$\frac{1729}{741}=\frac{17+2+9}{7+4+1};\quad \frac{1729}{910}=\frac{1+7+2+9}{9+1-0}$$
$$\frac{1729}{1482}=\frac{17+2+9}{14+8+2};\quad \frac{1729}{3640}=\frac{1+7+2+9}{36+4+0}$$
$$\frac{1729}{4368}=\frac{1+7+2+9}{4+36+8};\quad \frac{1729}{5460}=\frac{1+7+2+9}{54+6+0}.$$
$$\frac{1729}{8463}=\frac{1+7+2+9}{84+6+3};\quad \frac{1729}{8645}=\frac{1+7+2+9}{86+4+5}.$$

$$\frac{1729}{3458}=\frac{1-7+2+9}{3+4-5+8}=\frac{1-7-2+9}{3-4-5+8}=\frac{17+29}{34+58}$$
$$=\frac{17-2-9}{3-4+5+8}=\frac{17+2-9}{3+4+5+8}=\frac{17+2+9}{3+45+8}.$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) https://goo.gl/8atQMY; (ii) https://goo.gl/qidrGQ;
(iii) https://goo.gl/8zFbq7; (iv) https://goo.gl/yf7W1q;
(v) https://goo.gl/Gyj51q.

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Hardy-Ramanujan Number 1729

Equivalent Fractions with Basic Operations - II

On a special day: July 29, 17 (17-29)

$$\frac{1729}{364}=\frac{(17+2)\times 9}{(3+6)\times 4};\quad \frac{1729}{546}=\frac{(17+2)\times 9}{(5+4)\times 6}$$
$$\frac{1729}{6175}=\frac{1\times 7\times 2\times 9}{6\times 1\times 75};\quad \frac{1729}{6384}=\frac{1+7\times(2+9)}{(6+3)\times 8\times 4}.$$

$$\frac{1729}{3458}=\frac{1\times 7\times 29}{(3+4)\times 58}=\frac{1^{72}+9}{3+4+5+8}$$
$$=\frac{1+7\times(2+9)}{3\times 4\times(5+8)}=\frac{1+7+2\times 9}{3\times 4+5\times 8}$$
$$=\frac{1+7+29}{34+5\times 8}=\frac{17+2\times 9}{3\times 4+58}=\frac{172\times 9}{3\times(4^5+8)}.$$

$$\frac{1729}{8645}=\frac{1+7\times 2+9}{8\times(6+4+5)}=\frac{(1+7+2)\times 9}{(86+4)\times 5}$$
$$=\frac{1\times 7\times 2\times 9}{(8+6)\times 45}=\frac{1\times 7+2+9}{(8+6+4)\times 5}=\frac{1^7\times 2^9}{8\times 64\times 5}.$$

Inder J. Taneja
ijtaneja@gmail.com
http://inderjtaneja.com

(i) https://goo.gl/8atQMY; (ii) https://goo.gl/qidrGQ;
(iii) https://goo.gl/8zFbq7; (iv) https://goo.gl/yf7W1q;
(v) https://goo.gl/Gyj51q.

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References

[1] I.J. TANEJA, Crazy Sequential Representation: Numbers from 0 to 11111 in terms of Increasing and Decreasing Orders of 1 to 9, Jan. 2014, pp.1-161, *http://arxiv.org/abs/1302.1479 - https://goo.gl/DSqYVs*.

[2] I.J. TANEJA, Single Digit Representations of Natural Numbers, Feb. 1015, pp.1-55, *http://arxiv.org/abs/1502.03501*. Also in RGMIA Research Report Collection, **18**(2015), Art. 15, pp.1-55. *http://rgmia.org/papers/v18/v18a15.pdf - https://goo.gl/2L3mEk*.

[3] I.J. TANEJA, Single Letter Representations of Natural Numbers, Palindromic Symmetries and Number Patterns, RGMIA Research Report Collection, **18**(2015), Art. 40, pp.1-30. *http://rgmia.org/papers/v18/v18a40.pdf - https://goo.gl/8kQsS4*.

[4] I.J. TANEJA, Single Letter Representations of Natural Numbers, RGMIA Research Report Collection, **18**(2015), Art. 73, pp. 1-44. *http://rgmia.org/papers/v18/v18a73.pdf - https://goo.gl/xYvcY5*.

[5] I.J. TANEJA, Selfie Fractions: Addable, RGMIA Research Report Collection, **19**(2016), Art 113, pp. 1-72, *http://rgmia.org/papers/v19/v19a113.pdf - https://goo.gl/8atQMY*.

[6] I.J. TANEJA, Selfie Fractions: Dottable and Potentiable, RGMIA Research Report Collection, **19**(2016), Art 114, pp. 1-25, *http://rgmia.org/papers/v19/v19a114.pdf - https://goo.gl/qidrGQ*.

[7] I.J. TANEJA, Selfie Fractions: Addable and Dottable Together, RGMIA Research Report Collection, **19**(2016), Art 115, pp. 1-80, *http://rgmia.org/papers/v19/v19a115.pdf* - https://goo.gl/8zFbq7.

[8] I.J. TANEJA, Equivalent Selfie Fractions: Dottable, Addable and Subtractable, RGMIA Research Report Collection, **19**(2016), Art 116, pp. 1-40, *http://rgmia.org/papers/v19/v19a116.pdf* - https://goo.gl/yf7W1q.

[9] I.J. TANEJA, Equivalent Selfie Fractions: Addable and Dottable Together, RGMIA Research Report Collection, **19**(2016), Art 117, pp. 1-85, *http://rgmia.org/papers/v19/v19a117.pdf - https://goo.gl/Gyj51q*.

[10] I.J. TANEJA, Fibonacci Sequence and Selfie Numbers - I, RGMIA Research Report Collection, **19**(2016), Art 142, pp. 1-59, *http://rgmia.org/papers/v19/v19a142.pdf - https://goo.gl/ETctFz*.

[11] I.J. TANEJA, Fibonacci Sequence and Selfie Numbers - II, RGMIA Research Report Collection, **19**(2016), Art 143, pp. 1-47, *http://rgmia.org/papers/v19/v19a143.pdf - https://goo.gl/3f3zub*.

[12] I.J. TANEJA, Fibonacci Sequence and Selfie Numbers - III, RGMIA Research Report Collection, **19**(2016), Art 156, pp. 1-72, *http://rgmia.org/papers/v19/v19a156.pdf - https://goo.gl/MxAjXh*.

[13] I.J. TANEJA, Crazy Representations of Natural Numbers, Selfie Numbers, Fibonacci Sequence, and Selfie Fractions, RGMIA Research Report Collection, **19**(2016), Article 179, pp.1-60, *http://rgmia.org/papers/v19/v19a179.pdf - https://goo.gl/cG0jdL* .

[14] I.J. TANEJA, 2017 - Mathematical Style, RGMIA, Research Report Collection, **20**(2017), Article 03, pp.1-24, *http://rgmia.org/papers/v20/v20a03.pdf - https://goo.gl/dKbbxU*.

[15] I.J. TANEJA, Hardy-Ramanujan Number - 1729, RGMIA Research Report Collection, **20**(2017), Article 06, pp.1-50, *http://rgmia.org/papers/v20/v20a06.pdf https://goo.gl/3LNf35*.

[16] I.J. TANEJA, Patterns in Prime Numbers: Fixed Digits Repetitions, RGMIA Research Report Collection, **20**(2017), Article 17, pp.1-75, *http://rgmia.org/papers/v20/v20a17.pdf - https://goo.gl/PquvOe*.

[17] I.J. TANEJA, Fibonacci Sequence and Running Expressions with Equalities - I, RGMIA Research Report Collection, **20**(2017), Art. 35, pp. 1-83, *http://rgmia.org/papers/v20/v20a35.pdf - https://goo.gl/ZF0JZ3*.

[18] I.J. TANEJA, Simultaneous Representations of Selfie Numbers in Terms of Fibonacci and Triangular Numbers, RGMIA Research Report Collection, **20**(2017), Art. 55, pp. 1-87, *http://rgmia.org/papers/v20/v20a55.pdf - https://goo.gl/qEPB1V*.

[19] I.J. TANEJA, Multiple Choice Patterns in Prime Numbers - I, RGMIA Research Report Collection, **20**(2017), Art. 73, pp. 1-104, *http://rgmia.org/papers/v20/v20a73.pdf - https://goo.gl/rPyzjr*.

[20] I.J. TANEJA, Multiple Choice Patterns in Prime Numbers - II, RGMIA Research Report Collection, **20**(2017), Art. 74, pp. 1-109, *http://rgmia.org/papers/v20/v20a74.pdf - https://goo.gl/1FwzLc*.

[21] I.J. TANEJA, Multiple Choice Patterns in Prime Numbers - III, RGMIA Research Report Collection, **20**(2017), Art. 93, pp. 1-113, *http://rgmia.org/papers/v20/v20a93.pdf - https://goo.gl/oW9EB6*.

[22] I.J. TANEJA, Multiple Choice Patterns in Prime Numbers - IV, RGMIA Research Report Collection, **20**(2017), Art. 94, pp. 1-150, *http://rgmia.org/papers/v20/v20a94.pdf - https://goo.gl/WbgsJE*.

[23] I.J. TANEJA, Selfie Palindromic Magic Squares, RGMIA Research Report Collection, **18**(2015), Art. 98, pp.1-15. *http://rgmia.org/papers/v18/v18a98.pdf - https://goo.gl/n3mhe5*.

[24] I.J. TANEJA, Intervally Distributed, Palindromic, Selfie Magic Squares, and Double Colored Patterns, RGMIA Research Report Collection, **18**(2015), Art. 127, pp.1-45. *http://rgmia.org/papers/v18/v18a127.pdf - https://goo.gl/yzcRWa*.

[25] I.J. TANEJA, Intervally Distributed, Palindromic and Selfie Magic Squares: Genetic Table and Colored Pattern – Orders 11 to 20, RGMIA Research Report Collection, **18**(2015), Art. 140, pp.1-43. *http://rgmia.org/papers/v18/v18a140.pdf - https://goo.gl/DE1iyK*.

[26] I.J. TANEJA, Intervally Distributed, Palindromic and Selfie Magic Squares – Orders 21 to 25 , **18**(2015), Art. 151, pp.1-33. *http://rgmia.org/papers/v18/v18a151.pdf - https://goo.gl/rzJYuG*.

[27] I.J. TANEJA, Magic Square Type Extended Row Palprimes of Orders 5x5 and 7x7, ÂăResearch Report Collection, **20**(2017), Art. 21, pp. 1-69, *http://rgmia.org/papers/v20/v20a21.pdf - https://goo.gl/Vv1v3G*.

[28] I.J. TANEJA, Magic Square Type Symmetric and Embedded Palprimes of Order 9x9 - I, Research Report Collection, **20**(2017), Art. 22, pp. 1-63, *http://rgmia.org/papers/v20/v20a22.pdf - https://goo.gl/62syas*.

[29] I.J. TANEJA, Magic Square Type Symmetric and Embedded Palprimes of Order 9x9 - II, Research Report Collection, **20**(2017), Art. 23, pp. 1-92, *http://rgmia.org/papers/v20/v20a23.pdf - https://goo.gl/9tsBH0*.
