The problem of digital sets (DS) all permutations of which generate primes is discussed. Such sets may include only four types of digits: 1, 3, 7 and 9. The direct computations show that for N-digit (ND) integers such DS’s occur at N = 1, 2, 3, and are absent in the 4 - 10 interval of N. On the other hand in N = 19, 23, 317 and 1031 cases (as well as in N = 2 case) the formal ”total” permutation is provided by ”repunits”, integers with all digits being 1. The existence/nonexistence of other (not repunits) full-permutation DS’s for arbitrary large N is an open question with probable negative answer. Maximal-permutation DS’s with maximal number of primes are given for various numbers of digits.

Keywords: Number theory, Permutations, Prime numbers

The primes are real pearls among all integers and are subject of long-standing (several thousand year) researches. The many amazing results are established on primes [1, 2, 3]. The number of primes are infinite (by the way the largest known prime with 2 098 960 digits, $2^{6972593} - 1$, was found quite recently [1]) and their general behavior with n is at present well known and is described, e.g., by some built-in functions of MATHEMATICA [4]: PrimeQ[n] gives True if n is prime and False otherwise, Prime[n] gives nth prime (with assumption Prime[1] = 2), and PrimePi[n] gives number of all primes $\leq n$.

Using mainly MATHEMATICA’s means I discuss here a problem of the permutations of given digital set all giving prime. Consider some examples first. Already for two-digit primes one may note pairs 13/31, 17/71, 37/73, 79/97 - all primes, (one may add here fifth ”pair” 11/11 as well), while 19 ”loses” its partner, 91 which is not a prime, see Table 2. One may wonder: is it possible, in the more-digit cases, that full permutations of some DS all give primes?

In 3D case (Table 2, case B) the answer is positive, there are 3 full permutation DS’s: 113, 199 and 337, that is, for instance, all three possible permutations 113, 131 and 331 give primes. Other two interesting DS’s are 179 and 379 each giving even more primes, 4, which is however less than a corresponding total number of possible permutations - 6. Another DS with 6 permutations, 137, gives only 3 primes.

Notice that in this paper the ”basic” DS’s are written as first permutations in lexicografic order and they themselves are not necessarily primes. Two smallest such sets are 119 and 133 which are not primes while two other members of each permutation family (191, 911 and 313, 331, respectively) are primes. (And the largest such DS considered in this note is $7_29_8 = 7799999999$, see Table 8.)

Here is the place to clarify the point of terminology: speaking about, e.g. 137 as DS, I consider it as what in MATHEMATICA is List{1, 3, 7} with 3 elements; at another hand, 137 is also used as 3-digit integer in our usual 10-base arithmetic system. To avoid cumbersome notations I assume this not-too-rigorous approach.

It is evident that full permutation may give all primes for DS’s comprising only of digits.
1, 3, 7 and 9, and *none* of 0, 2, 4, 5, 6, 8 digits. This greatly reduces the field of search, removing all integers containing at least one of the digits 0, 2, 4, 5, 6 or 8.

The program was written in MATHEMATICA for searching such full permutations among "1-3-7-9" primes with the negative answer for 4 to 10-digit integers. In all cases number of primes provided by any given DS is *less* than number of *all* possible permutations, see attached Figures and Tables. This is the main (and negative) result, but some other remarks may be made on the by-products of calculations.

1. Primes among all "1-3-7-9" integers may be briefly described by "N-P-D" code as follows:

```
1 - 2 - 2, 2 - 10 - 6, 3 - 30 - 12, 4 - 63 - 14, 5 - 249 - 35, 6 - 757 - 54, 7 - 2 709 - 74, 8 - 9 177 - 101, 9 - 33 191 - 142, 10 - 118 912 - 184,
```

where N is number of digits, P is number of primes and D is number of DS’s.

For all primes (with arbitrary digits) "N-P-D" figures are:

```
1 - 4 - 4, 2 - 21 - 17, 3 - 143 - 86, 4 - 1 061 - 336, 5 - 8 363 - 1 109, 6 - 68 906 - 2 967, 7 - 586 081 - 7 041, 8 - 5 096 876 - 15 259, 9 - 45 086 079 - ?, 10 - 404 204 977 - ?.
```

There is of some interest that for smaller N "mean productivity" (P/D) of "1-3-7-9" DS’s are larger than that of all DS’s, while starting from N=5 number of primes per DS is larger for all DS:

**Table 1. Number of N digit primes per basic DS as function of N for "1-3-7-9" DS’s and all DS’s**

| N  | 1379 | all |
|----|------|-----|
| 1  | 1.0000 | 1.0000 |
| 2  | 1.6667 | 1.2353 |
| 3  | 2.5000 | 1.6628 |
| 4  | 4.5000 | 3.1577 |
| 5  | 7.1143 | 7.5410 |
| 6  | 14.0185 | 23.2241 |
| 7  | 36.6081 | 83.2383 |
| 8  | 90.8614 | 334.0242 |
| 9  | 233.7394 | ? |
| 10 | 646.2609 | ? |

I do not present values of D and distribution of number of primes per given DS in general case by two reasons, first due to necessity of the too time-consuming calculations, and second due to ambiguity of the problem, e.g. what to do with primes with zeros, as in this case some permutation of corresponding DS, with zeros at the beginning, give integers (and possible primes) with less number digits. First three such primes are 101, 103, 107 and last three such 10 digit primes are 9701, 9703 and 9707.

Another observation is that while there is a very strong correlation between p and c, the more rich permutation family does not necessarily give more primes; cf. 139 vs 113, or 1139 vs 1379.

3. As among primes with 4 to 10 digits there is no single full permutation, it is interesting to look for maximal permutations. Quite surprisingly, these "maximal" DS’s are not at all among "1-3-7-9" DS’s. From Table 2 one may note, that maximal "1-3-7-9" DS’s with 4 digits are 1379 with 7 primes and 1139 with 8 primes. At the same time, there are 4 "ordinary" DS’s (1349, 1457, 3479, 3679) with 9 primes, two (1579 and 1789) with 10, and two "super-sets" 1237 and 1279 with 11 primes. To be able to give more primes DS should comprise the even digits as well, not only odd ones. This fact is really very surprising, because number distribution of digits in, for example, 4D primes is not quite at all random, with great favor to digits 1, 3, 7, 9: Count[n] = 217, 603, 359, 602, 326, 327, 336, 574, 321, 579, at n=0 to 9, each digit from "1-3-7-9" family is roughly two times more common than any one of other family "0-2-4-5-6-8". Inspite of this, DS’s of "mixed races" are more productive in making primes. A very interesting observation which may find its application in the fields very far from primes and integers.

4. Some maximal permutation "1379" DS’s for the larger numbers of digits are:

| b      | c | p  | c/p |
|--------|---|----|-----|
| 5D     |   |    |     |
| 11339  | 15| 30 | .5000 |
| 13379  | 18| 60 | .3000 |
| 13799  | 29| 60 | .4833 |
| 6D     |   |    |     |
| 113779 | 60| 180| .3333 |
| 133379 | 35| 120| .2917 |
| 133799 | 55| 180| .3056 |
| 7D     |   |    |     |
| 1113799| 113|420| .2690 |
| 1133779| 182|630| .2889 |
| 1137799| 169|630| .2683 |
| 8D     |   |    |     |
| 11333779|419|1680| .2494 |
| 11337779|403|1680| .2399 |
| 11377999|397|1680| .2363 |
| 9D     |   |    |     |
| 113337799|1388|7560| .1836 |
| 113377999|1525|7560| .2017 |
| 113379999|1550|7560| .2050 |
| 10D    |   |    |     |
| 1113337799|4555|25200| .1808 |
| 1133777999|4606|25200| .1828 |
| 1133377799|4384|25200| .1740 |

In all cases c[i]<<p[i], and relation c/p has a tendency of decreasing with increasing N, that is in some sense, "probability" of appearing of full permutation among "1379" primes diminishes with increasing number of digits. One may considered it as a hint that the full-permutation "1379" DS is absent for arbitrary large N.
I conclude with guess that the existence/nonexistence of (not repunits) DS’s for arbitrary large N is an open question with probable negative answer.

FIG. 1. 6 digit case. Abscissae - order number of basic digit sets (BDS); see Table 4. Ordinates - upper curve: number of permutations of BDS as function of order number of BDS; lower curve: number of primes given by BDS as function of order number of BDS.
FIG. 2. 7 digit case. Abscissae - order number of basic digit sets (BDS); see Table 5. Ordinates - upper curve: number of permutations of BDS as function of order number of BDS; lower curve: number of primes given by BDS as function of order number of BDS.

FIG. 3. 8 digit case. Abscissae - order number of basic digit sets (BDS); see Table 6. Ordinates - upper curve: number of permutations of BDS as function of order number of BDS; lower curve: number of primes given by BDS as function of order number of BDS.
FIG. 4. 9 digit case. Abscissae - order number of basic digit sets (BDS); see Table 7. Ordinates - upper panel: number of primes given by BDS as function of order number of lower panel: number of permutations of BDS as function of order number of BDS
FIG. 5. 10 digit case. Abscissae - order number of basic digit sets (BDS); see Table 8. Ordinates - upper panel: number of primes given by BDS as function of order number of lower panel: number of permutations of BDS as function of order number of BDS
Table 2. A: 2-10-6 case. b - basic digit sets, c - counts, p - permutations.
Total number 10 = Sum[c[i]].
B: 3-30-12 case.
c[i] = p[i] at 3 cases, for b=113, 199 and 337.
C: 4-63-14 case.
c[i] < p[i] at all cases.
Note that basic digit sets are written as first ones in lexicographic order and they are not necessary primes themselves. Two least such sets are 119 and 133 which are not primes while two other members of each permutation family (191, 911 and 313, 331, respectively) are primes. Another observation is that while there is a very strong correlation between p and c, the more rich permutation family does not necessarily give more primes; cf. 139 vs 113, or 1139 vs 1379

|    | b | c | p  |    | b | c | p  |    | b | c | p  |
|----|---|---|----|----|---|---|----|----|---|---|----|
| A  | 11| 1 | 1  | 113| 3 | 3 | 1117| 2  | 4 |
|    | 13| 2 | 2  | 119| 2 | 3 | 1139| 8  | 12|
|    | 17| 2 | 2  | 133| 2 | 3 | 1333| 2  | 4 |
|    | 19| 1 | 2  | 137| 3 | 6 | 1337| 5  | 12|
|    | 37| 2 | 2  | 139| 2 | 6 | 1339| 5  | 12|
|    | 79| 2 | 2  | 179| 4 | 6 | 1379| 7  | 24|
|    | 199| 3 | 3  | 1399| 6 | 12|
|    | 337| 3 | 3  | 1777| 3 | 4 |
|    | 377| 1 | 3  | 1799| 5 | 12|
|    | 379| 4 | 6  | 1999| 2 | 4 |
|    | 779| 2 | 3  | 3337| 3 | 4 |
|    | 799| 1 | 3  | 3379| 6 | 12|
|    |    |    |    | 3779| 5 | 12|
|    |    |    |    | 3799| 4 | 12|
|    |    |    |    | 63  |    |    |
## Table 3. 5-249-35 case. b - 35 basic digit sets, c - counts, p - permutations.
Total number 249 = Sum[c[i]].
c[i] < p[i] at all i.

| b     | c  | p | b     | c  | p | b     | c  | p |
|-------|----|---|-------|----|---|-------|----|---|
| 11113 | 3  | 5 | 11117 | 2  | 5 | 11119 | 1  | 5 |
| 11137 | 5  | 20| 11177 | 5  | 10| 11179 | 9  | 20|
| 11333 | 4  | 10| 11339 | 15 | 30| 11377 | 10 | 30|
| 11399 | 13 | 30| 11777 | 3  | 10| 11779 | 12 | 30|
| 11999 | 5  | 10| 13333 | 2  | 5 | 13337 | 9  | 20|
| 13339 | 9  | 20| 13379 | 18 | 60| 13399 | 8  | 30|
| 13777 | 8  | 20| 13799 | 29 | 60| 13999 | 7  | 20|
| 17777 | 1  | 5 | 17779 | 5  | 20| 17999 | 7  | 20|
| 19999 | 1  | 5 | 33377 | 3  | 10| 33379 | 7  | 20|
| 33779 | 10 | 30| 33799 | 9  | 30| 37777 | 2  | 5 |
| 37799 | 10 | 30| 37999 | 9  | 20| 77779 | 4  | 5 |
| 77999 | 3  | 10| 79999 | 1  | 5 |       |    |   |

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249
Table 4. 6-757-54 Case

|     | b  | c  | p  |
|-----|----|----|----|
| 111113 | 3  | 6  |
| 111119 | 3  | 6  |
| 111133 | 3  | 15 |
| 111137 | 9  | 30 |
| 111139 | 4  | 30 |
| 111179 | 8  | 30 |
| 111199 | 5  | 15 |
| 111337 | 28 | 60 |
| 111377 | 25 | 60 |
| 111379 | 27 | 120|
| 111779 | 15 | 60 |
| 111999 | 15 | 60 |
| 113333 | 3  | 15 |
| 113339 | 19 | 60 |
| 113377 | 16 | 90 |
| 113399 | 16 | 90 |
| 113777 | 16 | 60 |
| 113779 | 60 | 180|
| 113999 | 13 | 60 |
| 117779 | 20 | 60 |
| 117799 | 23 | 90 |
| 119999 | 1  | 15 |
| 133333 | 3  | 6  |
| 133337 | 11 | 30 |
| 133339 | 7  | 30 |
| 133379 | 35 | 120|
| 133399 | 15 | 60 |
| 133777 | 18 | 60 |
| 133799 | 55 | 180|
| 133999 | 23 | 60 |
| 137777 | 10 | 30 |
| 137779 | 32 | 120|
| 137999 | 28 | 120|
| 139999 | 9  | 30 |
| 177779 | 3  | 30 |
| 177799 | 20 | 60 |
| 179999 | 9  | 30 |
| 199999 | 3  | 6  |
| 333337 | 2  | 6  |
| 333377 | 2  | 15 |
| 333379 | 13 | 30 |
|   |   |   |
|---|---|---|
|333779| 25 | 60 |
|333799| 12 | 60 |
|337777| 4  | 15 |
|337799| 20 | 90 |
|337999| 21 | 60 |
|377777| 2  | 6  |
|377779| 9  | 30 |
|377999| 21 | 60 |
|379999| 6  | 30 |
|777779| 1  | 6  |
|777799| 3  | 15 |
|779999| 1  | 15 |
|799999| 2  | 6  |
Table 5. 7-2709-74 Case

|   | b   | c  | p  |
|---|-----|----|----|
| 1 | 1111117 | 3  | 7  |
| 2 | 1111133 | 6  | 21 |
| 3 | 1111139 | 6  | 42 |
| 4 | 1111177 | 5  | 21 |
| 5 | 1111199 | 5  | 21 |
| 6 | 1111333 | 11 | 35 |
| 7 | 1111337 | 22 | 105|
| 8 | 1111339 | 29 | 105|
| 9 | 1111379 | 50 | 210|
| 10| 1111399 | 25 | 105|
| 11| 1111777 | 8  | 35 |
| 12| 1111799 | 25 | 105|
| 13| 1111999 | 9  | 35 |
| 14| 1113337 | 38 | 140|
| 15| 1113377 | 51 | 210|
| 16| 1113379 | 89 | 420|
| 17| 1113779 | 95 | 420|
| 18| 1113799 | 113| 420|
| 19| 1117777 | 9  | 35 |
| 20| 1117799 | 49 | 210|
| 21| 1117999 | 37 | 140|
| 22| 1133333 | 10 | 21 |
| 23| 1133339 | 38 | 105|
| 24| 1133377 | 47 | 210|
| 25| 1133399 | 52 | 210|
| 26| 1133777 | 65 | 210|
| 27| 1133779 | 182| 630|
| 28| 1133999 | 68 | 210|
| 29| 1137779 | 106| 420|
| 30| 1137799 | 169| 630|
| 31| 1139999 | 25 | 105|
| 32| 1177777 | 6  | 21 |
| 33| 1177799 | 37 | 210|
| 34| 1177999 | 47 | 210|
| 35| 1199999 | 6  | 21 |
| 36| 1333333 | 4  | 7  |
| 37| 1333337 | 10 | 42 |
| 38| 1333339 | 11 | 42 |
| 39| 1333379 | 51 | 210|
| 40| 1333399 | 31 | 105|
| 41| 1333777 | 32 | 140|
1333799  103  420
1333999  28  140
1337777  38  105
1337779  101  420
1337999  90  420
1339999  19  105
1377779  52  210
1377799  98  420
1379999  55  210
1399999  8  42
1777799  26  105
1777999  37  140
1799999  12  42
1999999  1  7
3333377  2  21
3337777  8  35
3377777  3  21
3377779  24  105
3379999  48  210
3379999  19  105
3777779  10  42
3777799  23  105
3779999  19  105
3799999  10  42
7777999  6  21
7777999  16  35
7799999  5  21
| b        | c  | p  |
|----------|----|----|
| 11111113 | 4  | 8  |
| 11111117 | 3  | 8  |
| 11111119 | 3  | 8  |
| 11111137 | 13 | 56 |
| 11111179 | 12 | 56 |
| 11111333 | 13 | 56 |
| 11111339 | 42 | 168|
| 11111377 | 46 | 168|
| 11111399 | 41 | 168|
| 11111777 | 15 | 56 |
| 11111779 | 42 | 168|
| 11111999 | 15 | 56 |
| 11113333 | 9  | 70 |
| 11113337 | 70 | 280|
| 11113339 | 79 | 280|
| 11113379 | 197| 840|
| 11113399 | 49 | 420|
| 11113777 | 66 | 280|
| 11113799 | 209| 840|
| 11113999 | 70 | 280|
| 11117777 | 13 | 70 |
| 11117779 | 63 | 280|
| 11117999 | 62 | 280|
| 11119999 | 11 | 70 |
| 11133337 | 63 | 280|
| 11133377 | 147| 560|
| 11133379 | 173| 1120|
| 11133779 | 412| 1680|
| 11133799 | 383| 1680|
| 11137777 | 51 | 280|
| 11137799 | 392| 1680|
| 11137999 | 178| 1120|
| 11177777 | 11 | 56 |
| 11177779 | 65 | 280|
| 11177999 | 138| 560|
| 11179999 | 73 | 280|
| 11333339 | 41 | 168|
| 11333377 | 67 | 420|
| 11333399 | 45 | 420|
| 11333777 | 115| 560|
| 11333779 | 419| 1680|
| File          | Block 1 | Block 2 |
|--------------|---------|---------|
| 11333999     | 123     | 560     |
| 11337779     | 403     | 1680    |
| 11337799     | 392     | 2520    |
| 11339999     | 53      | 420     |
| 11377777     | 41      | 168     |
| 11377799     | 376     | 1680    |
| 11377999     | 397     | 1680    |
| 11399999     | 36      | 168     |
| 11777779     | 36      | 168     |
| 11777999     | 138     | 560     |
| 11779999     | 52      | 420     |
| 13333333     | 4       | 8       |
| 13333337     | 13      | 56      |
| 13333339     | 14      | 56      |
| 13333379     | 64      | 336     |
| 13333399     | 43      | 168     |
| 13333777     | 75      | 280     |
| 13333799     | 228     | 840     |
| 13333999     | 64      | 280     |
| 13337777     | 62      | 280     |
| 13337779     | 173     | 1120    |
| 13337999     | 191     | 1120    |
| 13339999     | 60      | 280     |
| 13377779     | 190     | 840     |
| 13377799     | 382     | 1680    |
| 13379999     | 192     | 840     |
| 13399999     | 41      | 168     |
| 13777777     | 9       | 56      |
| 13777799     | 201     | 840     |
| 13777999     | 172     | 1120    |
| 13799999     | 52      | 336     |
| 13999999     | 10      | 56      |
| 17777777     | 1       | 8       |
| 17777779     | 14      | 56      |
| 17777999     | 61      | 280     |
| 17779999     | 53      | 280     |
| 17999999     | 10      | 56      |
| 19999999     | 2       | 8       |
| 33333337     | 2       | 8       |
| 33333379     | 9       | 56      |
| 33333779     | 37      | 168     |
| 33333799     | 44      | 168     |
| 33337777     | 10      | 70      |
| 33337799     | 52      | 420     |
| 33337999     | 44      | 280     |
|     |     |     |
|-----|-----|-----|
| 33377777 | 17  | 56  |
| 33377779 | 65  | 280 |
| 33377999 | 127 | 560 |
| 33379999 | 68  | 280 |
| 33777779 | 38  | 168 |
| 33777799 | 54  | 420 |
| 33779999 | 62  | 420 |
| 33799999 | 39  | 168 |
| 37777777 | 1   | 8   |
| 37777799 | 32  | 168 |
| 37777999 | 60  | 280 |
| 37799999 | 35  | 168 |
| 37999999 | 10  | 56  |
| 77777999 | 17  | 56  |
| 77779999 | 6   | 70  |
|   |   |   |
|---|---|---|
| 111111113 | 4 | 9 |
| 111111119 | 1 | 9 |
| 111111133 | 11 | 36 |
| 111111137 | 14 | 72 |
| 111111139 | 14 | 72 |
| 111111179 | 14 | 72 |
| 111111199 | 11 | 36 |
| 111111337 | 48 | 252 |
| 111111377 | 56 | 252 |
| 111111379 | 90 | 504 |
| 111111779 | 41 | 252 |
| 111111799 | 47 | 252 |
| 111113333 | 28 | 126 |
| 111113339 | 89 | 504 |
| 111113377 | 169 | 756 |
| 111113399 | 155 | 756 |
| 111113777 | 108 | 504 |
| 111113779 | 265 | 1512 |
| 111113999 | 69 | 504 |
| 111117779 | 92 | 504 |
| 111117799 | 159 | 756 |
| 111119999 | 24 | 126 |
| 111133333 | 22 | 126 |
| 111133337 | 131 | 630 |
| 111133339 | 135 | 630 |
| 111133379 | 503 | 2520 |
| 111133399 | 286 | 1260 |
| 111133777 | 231 | 1260 |
| 111133799 | 634 | 3780 |
| 111133999 | 237 | 1260 |
| 111137777 | 113 | 630 |
| 111137779 | 504 | 2520 |
| 111137999 | 470 | 2520 |
| 111139999 | 136 | 630 |
| 111177779 | 126 | 630 |
| 111177799 | 218 | 1260 |
| 111179999 | 117 | 630 |
| 111199999 | 21 | 126 |
| 111333337 | 119 | 504 |
| 111333377 | 248 | 1260 |
| Number          | Value 1 | Value 2 |
|----------------|---------|---------|
| 111333379      | 495     | 2520    |
| 111333779      | 833     | 5040    |
| 111333799      | 954     | 5040    |
| 111337777      | 272     | 1260    |
| 111337799      | 1525    | 7560    |
| 111377999      | 1012    | 5040    |
| 111377777      | 116     | 504     |
| 111377779      | 470     | 2520    |
| 111377999      | 886     | 5040    |
| 111379999      | 528     | 2520    |
| 111777779      | 84      | 504     |
| 111777799      | 227     | 1260    |
| 111799999      | 237     | 1260    |
| 113333333      | 8       | 36      |
| 113333339      | 59      | 252     |
| 113333377      | 137     | 756     |
| 113333399      | 161     | 756     |
| 113333777      | 240     | 1260    |
| 113333779      | 776     | 3780    |
| 113333999      | 242     | 1260    |
| 113377777      | 931     | 5040    |
| 113377799      | 1388    | 7560    |
| 113377999      | 255     | 1260    |
| 113777777      | 136     | 756     |
| 113777799      | 1376    | 7560    |
| 113777999      | 1550    | 7560    |
| 113999999      | 170     | 756     |
| 113777777      | 56      | 252     |
| 113777779      | 308     | 1512    |
| 113779999      | 918     | 5040    |
| 113779999      | 642     | 3780    |
| 113999999      | 39      | 252     |
| 117777779      | 48      | 252     |
| 117777799      | 127     | 756     |
| 117799999      | 183     | 1260    |
| 117799999      | 157     | 756     |
| 119999999      | 12      | 36      |
| 133333333      | 2       | 9       |
| 133333337      | 16      | 72      |
| 133333339      | 6       | 72      |
| 133333379      | 95      | 504     |
| 133333399      | 48      | 252     |
| 133333777      | 117     | 504     |
| 133333799      | 300     | 1512    |
| Number       | First Digit | Second Digit |
|--------------|-------------|--------------|
| 337999999    | 47          | 252          |
| 377777777    | 1           | 9            |
| 377777779    | 14          | 72           |
| 377777999    | 121         | 504          |
| 377779999    | 96          | 630          |
| 377999999    | 38          | 252          |
| 379999999    | 14          | 72           |
| 777777799    | 5           | 36           |
| 777779999    | 13          | 126          |
| 777799999    | 32          | 126          |
| 779999999    | 9           | 36           |
| 799999999    | 1           | 9            |
Table 8. 10-118912-184 Case

| b         | c | p  |
|------------|---|----|
| 1111111117 | 2 | 10 |
| 1111111133 | 5 | 45 |
| 1111111139 | 9 | 90 |
| 1111111177 | 4 | 45 |
| 1111111199 | 5 | 45 |
| 1111111333 | 22| 120|
| 1111111337 | 79| 360|
| 1111111339 | 64| 360|
| 1111111379 | 97| 720|
| 1111111399 | 62| 360|
| 1111111777 | 23| 120|
| 1111111799 | 54| 360|
| 1111111999 | 29| 120|
| 1111113337 | 147| 840|
| 1111113377 | 157| 1260|
| 1111113379 | 492| 2520|
| 1111113779 | 496| 2520|
| 1111113799 | 482| 2520|
| 1111117777 | 20 | 210|
| 1111117799 | 180| 1260|
| 1111117999 | 147| 840|
| 1111333333 | 45 | 252|
| 1111333339 | 241| 1260|
| 1111333377 | 455| 2520|
| 1111333399 | 437| 2520|
| 1111333777 | 491| 2520|
| 1111333779 | 1379| 7560|
| 1111333999 | 479| 2520|
| 1111377779 | 709| 5040|
| 1111377999 | 1379| 7560|
| 1111399999 | 246| 1260|
| 1111777777 | 41 | 252|
| 1111777999 | 433| 2520|
| 1111779999 | 490| 2520|
| 1111999999 | 45 | 252|
| 1113333333 | 20 | 210|
| 1113333337 | 210| 1260|
| 1113333339 | 259| 1260|
| 1113333379 | 1184| 6300|
| 1113333399 | 388| 3150|
| 1113333777 | 754| 4200|
| Phone          | Value 1 | Value 2 |
|----------------|---------|---------|
| 1111333799     | 2242    | 12600   |
| 1111333999     | 673     | 4200    |
| 1111337777     | 449     | 3150    |
| 1111337779     | 2320    | 12600   |
| 1111337999     | 2500    | 12600   |
| 1111339999     | 451     | 3150    |
| 1111377779     | 1096    | 6300    |
| 1111377799     | 2288    | 12600   |
| 1111379999     | 1077    | 6300    |
| 1111399999     | 222     | 1260    |
| 1111777777     | 20      | 210     |
| 1111777799     | 414     | 3150    |
| 1111779999     | 799     | 4200    |
| 1111999999     | 235     | 1260    |
| 1113333337     | 174     | 840     |
| 1113333377     | 435     | 2520    |
| 1113333379     | 702     | 5040    |
| 1113333779     | 2132    | 12600   |
| 1113337799     | 2225    | 12600   |
| 1113377777     | 763     | 4200    |
| 1113377999     | 4555    | 25200   |
| 1113777777     | 421     | 2520    |
| 1113777799     | 2171    | 12600   |
| 1113779999     | 4252    | 25200   |
| 1113799999     | 2131    | 12600   |
| 1113799999     | 721     | 5040    |
| 1117777777     | 24      | 120     |
| 1117777799     | 428     | 2520    |
| 1117779999     | 806     | 4200    |
| 1117999999     | 503     | 2520    |
| 1117999999     | 127     | 840     |
| 1133333333     | 2       | 45      |
| 1133333339     | 76      | 360     |
| 1133333377     | 151     | 1260    |
| 1133333399     | 145     | 1260    |
| 1133337777     | 410     | 2520    |
| 1133337799     | 1392    | 7560    |
| 1133339999     | 453     | 2520    |
| 1133377779     | 2311    | 12600   |
| 1133377799     | 2823    | 18900   |
| Phone Number | Amount 1 | Amount 2  |
|--------------|----------|-----------|
| 1133339999   | 376      | 3150      |
| 1133377777   | 431      | 2520      |
| 1133377799   | 4166     | 25200     |
| 1133399999   | 4384     | 25200     |
| 1133777777   | 194      | 1260      |
| 1133777779   | 1346     | 7560      |
| 1133777999   | 4606     | 25200     |
| 1133779999   | 2755     | 18900     |
| 1133999999   | 148      | 1260      |
| 1137777779   | 505      | 2520      |
| 1137777799   | 1317     | 7560      |
| 1137779999   | 2240     | 12600     |
| 1139999999   | 1317     | 7560      |
| 1177777777   | 2        | 45        |
| 1177777799   | 153      | 1260      |
| 1177777999   | 442      | 2520      |
| 1177799999   | 459      | 2520      |
| 1179999999   | 142      | 1260      |
| 1199999999   | 4        | 45        |
| 1333333333   | 1        | 10        |
| 1333333337   | 18       | 90        |
| 1333333339   | 16       | 90        |
| 1333333379   | 101      | 720       |
| 1333333399   | 67       | 360       |
| 1333333777   | 174      | 840       |
| 1333333799   | 502      | 2520      |
| 1333333999   | 163      | 840       |
| 1333337777   | 250      | 1260      |
| 1333337779   | 697      | 5040      |
| 1333337999   | 729      | 5040      |
| 1333339999   | 219      | 1260      |
| 1333777779   | 993      | 6300      |
| 1333777799   | 2332     | 12600     |
| 1333799999   | 1066     | 6300      |
| 1333999999   | 218      | 1260      |
| 1337777777   | 137      | 840       |
| 1337777799   | 2279     | 12600     |
| 1337779999   | 2419     | 16800     |
| 1337999999   | 733      | 5040      |
| 1339999999   | 172      | 840       |
| 1377777777   | 69       | 360       |
| 1377777779   | 455      | 2520      |
| 1377779999   | 2107     | 12600     |
| Phone Number | Duration | Rate  |
|--------------|----------|-------|
| 13377799999 | 2310     | 12600 |
| 13379999999 | 473      | 2520  |
| 13399999999 | 67       | 360   |
| 13777777779 | 87       | 720   |
| 13777777799 | 454      | 2520  |
| 13777799999 | 1118     | 6300  |
| 13777999999 | 659      | 5040  |
| 13799999999 | 86       | 720   |
| 13999999999 | 12       | 90    |
| 17777777777 | 2        | 10    |
| 17777777799 | 70       | 360   |
| 17777777999 | 130      | 840   |
| 17777799999 | 247      | 1260  |
| 17779999999 | 166      | 840   |
| 17999999999 | 11       | 90    |
| 19999999999 | 1        | 10    |
| 33333333777 | 2        | 45    |
| 33333333799 | 16       | 90    |
| 33333337779 | 58       | 360   |
| 33333337999 | 68       | 360   |
| 33333377777 | 25       | 210   |
| 33333377799 | 181      | 1260  |
| 33333379999 | 145      | 840   |
| 33333777777 | 38       | 252   |
| 33333777799 | 233      | 1260  |
| 33333779999 | 405      | 2520  |
| 33337799999 | 226      | 1260  |
| 33337777779 | 233      | 1260  |
| 33337777799 | 415      | 3150  |
| 33337779999 | 419      | 3150  |
| 33337999999 | 221      | 1260  |
| 33377777777 | 21       | 120   |
| 33377777799 | 395      | 2520  |
| 33377779999 | 765      | 4200  |
| 33377999999 | 486      | 2520  |
| 33379999999 | 147      | 840   |
| 33777777777 | 1        | 45    |
| 33777777779 | 70       | 360   |
| 33777777999 | 409      | 2520  |
| 33777799999 | 430      | 3150  |
| 33779999999 | 144      | 1260  |
| 33799999999 | 65       | 360   |
| 37777777779 | 12       | 90    |
| 37777777799 | 62       | 360   |
| 37777799999 | 182      | 1260  |
It should be noted that at this web-page 36 "absolute prime numbers" are given all coinciding with primes given by the full-permutation DS’s considered in this note. Moreover the notions are somewhere in [1,2] presented that: a) "all other repunits are composite to 130000" and b) "an absolute prime is one that remains a prime, for all permutations of its digits".

[1 ] www.utm.edu/research/primes.
[2 ] www.utm.edu/research/primes/ lists/topen/topten36.htm/E9E36.

[3 ] L. Alexandrov, math/9811096

[4 ] S. Wolfram. Mathematica. 2nd ed. Addison Wesley, 1991