An interesting pattern of primes

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If you observe below there is a a correlation between x and y . X will Always be a positive even number and y will always be a positive odd number and its subtraction will give 7 until a certain prime number and there after it will be a different correlation where the result is 8 and after a while it will be 9 and so on. Later i will repost its new correlation, for now it is enough to see that this pattern holds until the 1062 nd prime.

```
mathematica
( Defining the ordered pairs )
pairs = {{8, 1}, {10, 3}, {12, 5}, {14, 7}, {16, 9}, {18, 11}, {20, 13}, {22, 15}, {24, 17}, {26, 19}, {28, 21}, {30, 23}};

( Function to verify if a is prime )
isPrimeZ[x_, y_] := Module[{z},
    z = 7000 + 914 + y;
    z == 7907 + x && PrimeQ[z]
  ];

( Filttering the pairs that satisfy the conditiom)
results = Select[pairs, isPrimeZ[#[[1]], #[[2]]] &];

( Exihibiting the results)
results
```

$$\{\{12,5\},\{20,13\},\{26,19\},\{30,23\}\}$$

```
mathematica
( Defining the ordered pairs )
pairs =
{{10,2},{12,4},{14,6},{16,8},{18,10},{20,12},{22,14},{24,16},{26,18},{28,20},{30,22},{32,24},{34,26},{36,28},{38,30},{40,32},{42,34},{44,36},{46,38},{48,40},{50,42},{52,44},{54,46},{56,48},{58,50},{60,52},{62,54},{64,56},{66,58},{68,60},{70,62},{72,64},{74,66},{76,68},{78,70},{80,72},{82,74},{84,76},{86,78},{88,80},{90,82}};

( Function to verify if a is prime )
isPrimeZ[x_, y_] := Module[{z},
  z = 16000 + 1395 + y;
  z == 17387 + x && PrimeQ[z]
];

( Filttering the pairs that satisfy the conditiom)
results = Select[pairs, isPrimeZ[#[[1]], #[[2]]] &];
```

(Exihibiting the results)
Results

RULE 1

{{14,6},{30,22},{32,24},{44,36},{56,48},{62,54},{80,72},{84,76},{90,82}}

```
mathematica
AS=Cases[Tuples[Range[190],2],{p_,i_}/;EvenQ@p && OddQ@i && p-i==7]
( Defining the ordered pairs )
pairs = AS;

( Function to verify if a is prime )
isPrimeZ[x_, y_] := Module[{z},
  z = 7000 + 914 + y;
  z == 7907 + x && PrimeQ[z]
];

( Filttering the pairs that satisfy the condition)
results = Select[pairs, isPrimeZ[#[[1]], #[[2]]] &];

( Exihibiting the results)
results
po = results[[All, 1]]
Differences[%]
pp=results[[All, 2]]
pc=pairs[[All,1]]
ListLinePlot[results]
a=ListLinePlot[po,PlotStyle->Red]
b=ListLinePlot[pp,PlotStyle->Green]
d=ListLinePlot[pc,PlotStyle->Blue]
c=Show[a,b,d]
```

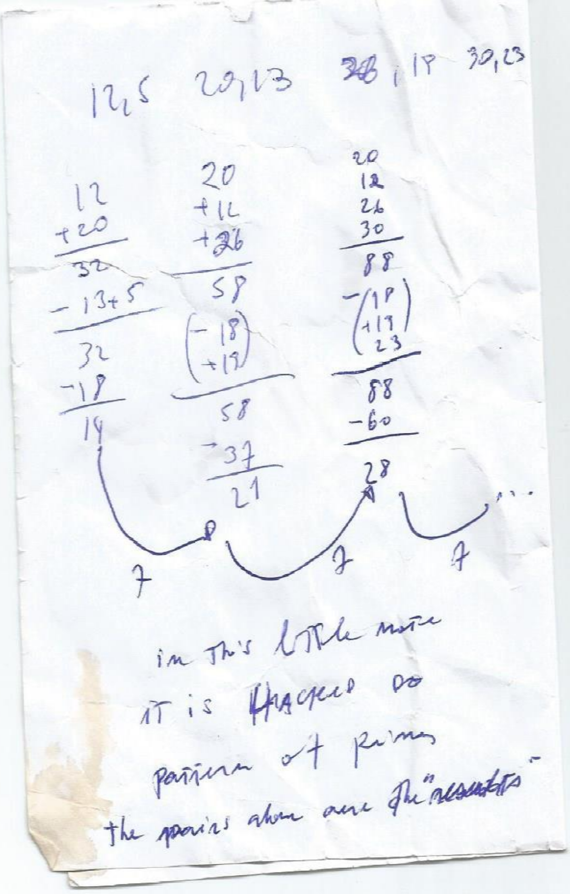
{{12,5},{20,13},{26,19},{30,23},{42,35},{44,37},{56,49},{86,79},{102,95},{104,97},{110,103},{132,125},{146,139},{152,145},{162,155},{174,167},{180,173},{182,175},{186,179}}

{12,20,26,30,42,44,56,86,102,104,110,132,146,152,162,174,180,182,186}
{8,6,4,12,2,12,30,16,2,6,22,14,6,10,12,6,2,4} THE DISTANCE BTWEEN EVERY ORDERED PAIR THAT GIVES A PRIME GIVES BY SUM THE NEXT ODD NUMBER IN THE PAIRS
{5,13,19,23,35,37,49,79,95,97,103,125,139,145,155,167,173,175,179}

8+5=13 ,13+6=19,19+4=23,23+12=35 AND SO ON

AND FINALLY WRITTEN IN PORTUGUESE AND FOR THE SAKE OF IDENTITY THE CONJECTURE THAT SEEMS TO HOLD TRUE :

{{12,5},{20,13},{26,19},{30,23},{42,35},{44,37},{56,49},{86,79},{102,95},{104,97},{110,103},{132,125},{146,139},{152,145},{162,155},{174,167},{180,173},{182,175},{186,179}} a Soma consecutiva dos pares dos pares ordenados menos a soma consecutiva dos impares progressivamente dá múltiplos consecutivos de 7....



12,5 20,13 ~~28~~ ,19 30,23

12
+20
32
−13+5
32
−18
14

20
+12
+26
58
−18
+19
58
−37
21

20
12
26
30
88
−18
+19
23
88
−60
28

7 7 7 ...

in this little note
it is tracked do
pattern of primes
the pairs above are the "results"

pairs={{12,5},{20,13},{26,19},{30,23},{42,35},{44,37},{56,49},{86,79},{102,95},{104,97},{110,103},{132,125},{146,139},{152,145},{162,155},{174,167},{180,173},{182,175},{186,179},{194,187},{

204,197},{210,203},{216,209},{240,233},{254,247},{260,253},{264,257},{272,265},{284,277},{302,295},{312,305},{314,307},{324,317},{326,319},{330,323},{336,329},{356,349},{362,355},{366,359},{380,373},{384,377},{386,379},{390,383},{404,397},{410,403},{422,415},{446,439},{456,449},{462,455},{470,463},{480,473},{482,475}}

list = pairs[[All, 1]]

list2=pairs[[All,2]]

list3=Drop[list2,2]

pairs = Table[{list[[i]], list[[i + 2]]}, {i, 1, Length[list] - 2}];

sums = Map[Total, pairs];

sums

division=sums/2

list3-division

PrimeQ[list2]

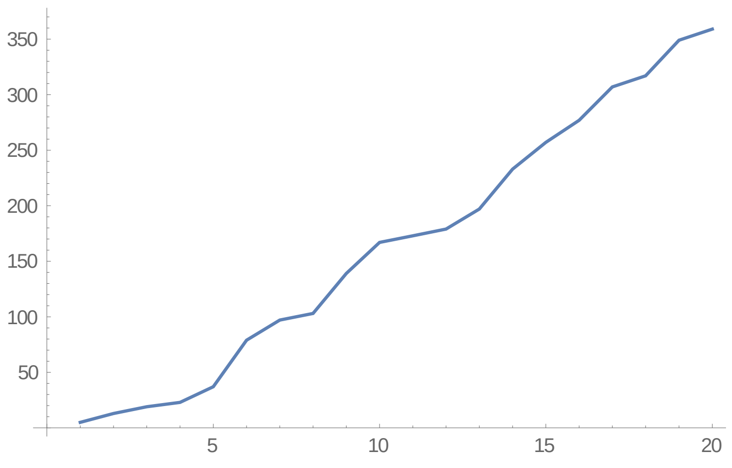
a=Select[list2,PrimeQ,(20)]

ListLinePlot[a]

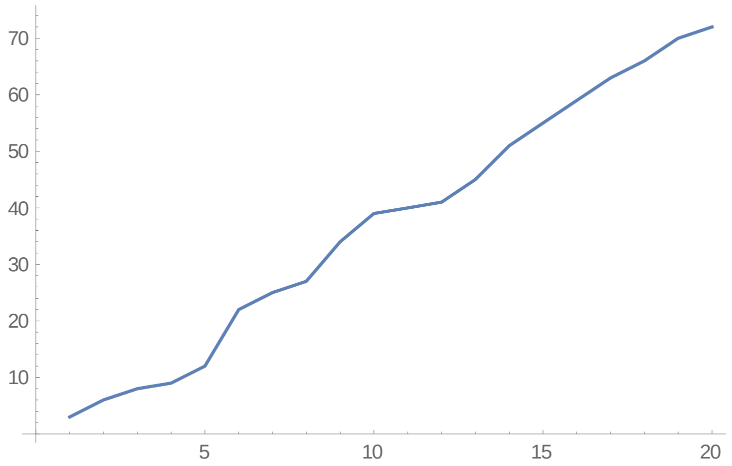
PrimePi[a]

ListLinePlot[%]

{5,13,19,23,37,79,97,103,139,167,173,179,197,233,257,277,307,317,349,359}



{3,6,8,9,12,22,25,27,34,39,40,41,45,51,55,59,63,66,70,72}



pairs={{12,5},{20,13},{26,19},{30,23},{42,35},{44,37},{56,49},{86,79},{102,95},{104,97},{110,103},{132,125},{146,139},{152,145},{162,155},{174,167},{180,173},{182,175},{186,179},{194,187},{204,197},{210,203},{216,209},{240,233},{254,247},{260,253},{264,257},{272,265},{284,277},{302,295},{312,305},{314,307},{324,317},{326,319},{330,323},{336,329},{356,349},{362,355},{366,359},{380,373},{384,377},{386,379},{390,383},{404,397},{410,403},{422,415},{446,439},{456,449},{462,455},{470,463},{480,473},{482,475},{512,505},{516,509},{522,515},{524,517},{536,529},{540,533},{554,547},{560,553},{594,587}}

list = pairs[[All, 1]]

list2=pairs[[All,2]]

list3=Drop[list2,2]

pairs = Table[{list[[i]], list[[i + 2]]}, {i, 1, Length[list] - 2}];

sums = Map[Total, pairs];

sums

division=sums/2

list3-division

PrimeQ[list2]

a=Select[list2,PrimeQ,(60)]

ListLinePlot[a] 1)

PrimePi[a]

ListLinePlot[%] 2)

series = {3,6,8,9,12,22,25,27,34,39,40,41,45,51,55,59,63,66,70,72,74,75,76,78,85,87,90,97,101,107}

pairs = Table[series[[i]] + series[[Length[series] - i + 1]], {i, 1, Floor[Length[series]/2]}]

ListLinePlot[pairs]

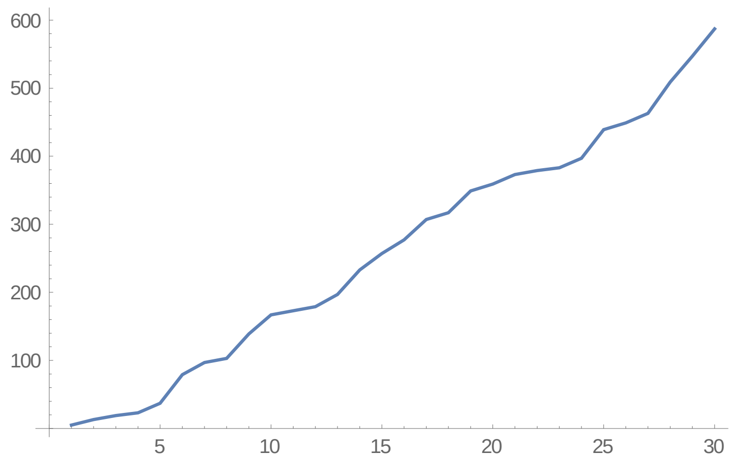
po = Table[pairs[[i]] + pairs[[Length[pairs] - i + 1]], {i, 1, Floor[Length[pairs]/2]}]

ListLinePlot[pairs]

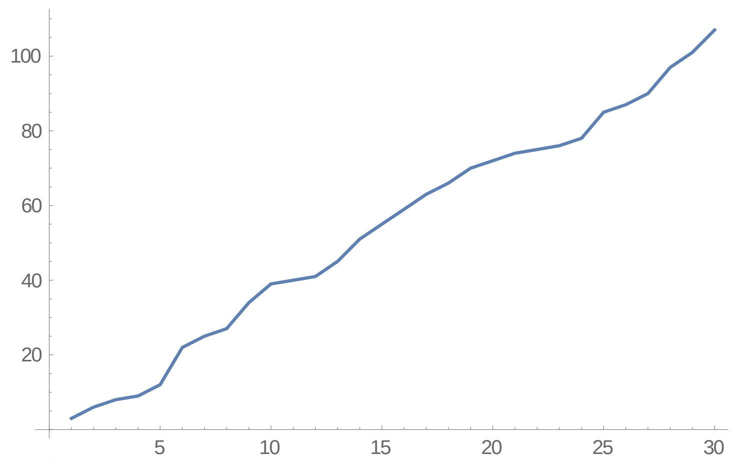
de=a-(series*2)

PrimeQ[de]

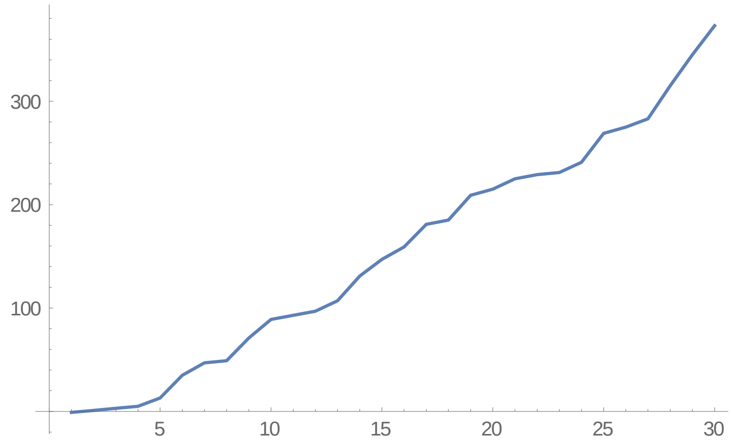
ListLinePlot[de] 3)



1)



2)



3)

The following program algorith checks if there is other forms of pairs that satisfy a certain pattern: Please use a translator to convert the texts in to english as it was originally formulated in portuguese.

(* Definindo os pares ordenados *)

pairs = {{12, 5}, {20, 13}, {26, 19}, {30, 23}, {42, 35}, {44, 37}, {56, 49}, {86, 79}, {102, 95}, {104, 97}};

(* Função para verificar a propriedade *)verificarPropriedade[pairs_List] := Module[{n, i, par1, impar1, par2, impar2, soma1, soma2, resultado}, n = Length[pairs];

resultado = True; For[i = 1, i <= Floor[n/2], i++,   par1 = pairs[[i, 1]];   impar1 = pairs[[i, 2]];   par2 = pairs[[n - i + 1, 1]];

impar2 = pairs[[n - i + 1, 2]];

soma1 = par1 + impar2;

soma2 = impar1 + par2;

If[soma1 != soma2,   resultado = False;   Break[];   ];]; resultado]

(* Verificando a propriedade *)verificarPropriedade[pairs]

True

PROGRAM 2

pairs = {{12, 5}, {20, 13}, {26, 19}, {30, 23}, {42, 35}, {44, 37}, {56, 49}, {86, 79}, {102, 95}, {104, 97}};

(* Função para verificar a propriedade *)verificarPropriedade[pairs_List] := Module[{n, i, par1, impar1, par2, impar2, soma1, soma2, resultado}, n = Length[pairs];

resultado = True;

For[i = 1, i <= Floor[n/2], i++,   par1 = pairs[[i, 1]];   impar1 = pairs[[i, 2]];   par2 = pairs[[n - i + 1, 1]];

impar2 = pairs[[n - i + 1, 2]];

soma1 = par1 + impar2;

soma2 = impar1 + par2;

If[soma1 != soma2,   resultado = False;   Break[];   ];]; resultado]

(* Verificando a propriedade *)verificarPropriedade[pairs]

(* Modificando os pares para garantir somas únicas *)modificarPares[pairs_List] := Module[{n, i, novoPar}, n = Length[pairs]; Table[novoPar = {pairs[[i, 1]], pairs[[i, 2]]}; While[MemberQ[Table[pairs[[j, 1]] + pairs[[n - j + 1, 2]], {j, 1, Floor[n/2]}], novoPar[[1]] + novoPar[[2]]], novoPar = {novoPar[[1]] + 2, novoPar[[2]] + 2};]; novoPar, {i, 1, n}]]

(* Modificando os pares *)paresModificados =modificarPares[pairs];

(* Verificando a propriedade nos pares modificados *)

verificarPropriedade(paresModificados)

(* Exibindo os pares modificados *)paresModificados

True

{{12 verificarPropriedade,5 verificarPropriedade},{20 verificarPropriedade,13 verificarPropriedade},{26 verificarPropriedade,19 verificarPropriedade},{30 verificarPropriedade,23 verificarPropriedade},{42 verificarPropriedade,35 verificarPropriedade},{44 verificarPropriedade,37 verificarPropriedade},{60 verificarPropriedade,53 verificarPropriedade},{86 verificarPropriedade,79 verificarPropriedade},{102 verificarPropriedade,95 verificarPropriedade},{104 verificarPropriedade,97 verificarPropriedade}}

{{12,5},{20,13},{26,19},{30,23},{42,35},{44,37},{60,53},{86,79},{102,95},{104,97}}

nn = Range[1, 10000000];n = Select[nn, PrimeQ, (1000)];

k = (n^2) - 1 + n + (2 - 4 n);d = n^4 - 1 + n^2;c = n^3 + 2;e = Mod[c, 3];

f = Mod[d, 3];

g = Mod[k, 3];

h = Mod[c, 7];

i = Mod[d, 7];

j = Mod[k, 7];

l = Mod[c, 4];

m = Mod[d, 4];

o = Mod[k, 4];

r = Mod[c, 5];

s = Mod[d, 5];

t = Mod[k, 5];

QQ = Transpose[{e, f, g, h, i, j, l, m, o, r, s, t}];

validNumbers = Select[Range[7963, 8050], Module[{n2 = #, k1, d1, c1, e1, f1, g1, h1, i1, j1, l1, m1, o1, r1, s1, t1, pp1}, k1 = (n2^2) - 1 + n2 + (2 - 4 n2);

d1 = n2^4 - 1 + n2^2;

```
c1 = n2^3 + 2;
  e1 = Mod[c1, 3];
    f1 = Mod[d1, 3];
      g1 = Mod[k1, 3];
        h1 = Mod[c1, 7];
          i1 = Mod[d1, 7];
            j1 = Mod[k1, 7];
              l1 = Mod[c1, 4];
                m1 = Mod[d1, 4];
                  o1 = Mod[k1, 4];
                    r1 = Mod[c1, 5];
                      s1 = Mod[d1, 5];
                        t1 = Mod[k1, 5];
                          pp1 = {e1, f1, g1, h1, i1, j1, l1, m1, o1, r1, s1, t1};
                            MemberQ[QQ, pp1]  ] &];
                            validNumbers


oddNumbers = Select[validNumbers, OddQ];
validNumbers = Select[oddNumbers, Mod[2^#, #] == 2 &];


validNumbers


{7963,7967,7969,7979,7981,7982,7983,7985,7987,7991,7993,7997,7999,8003,8009,8011,8017,8021,8023,8027,8033,8039,8041,8047}
{7963,7993,8009,8011,8017,8039}



nn = Range[1, 10000000];ng=Select[nn,OddQ,(5000)];n = Select[ng, CompositeQ, (1000)];
k = (n^2) - 1 + n + (2 - 4 n);d = n^4 - 1 + n^2;c = n^3 + 2;e = Mod[c, 3];
f = Mod[d, 3];
g = Mod[k, 3];
```

```
h = Mod[c, 7];

i = Mod[d, 7];

j = Mod[k, 7];

l = Mod[c, 4];

m = Mod[d, 4];

o = Mod[k, 4];

r = Mod[c, 5];

s = Mod[d, 5];

t = Mod[k, 5];

QQ = Transpose[{e, f, g, h, i, j, l, m, o, r, s, t}];

validNumbers = Select[Range[7963, 8050],   Module[{n2 = #, k1, d1, c1, e1, f1, g1, h1, i1, j1, l1,
m1, o1, r1, s1, t1, pp1},    k1 = (n2^2) - 1 + n2 + (2 - 4 n2);

 d1 = n2^4 - 1 + n2^2;

  c1 = n2^3 + 2;

   e1 = Mod[c1, 3];

    f1 = Mod[d1, 3];

     g1 = Mod[k1, 3];

      h1 = Mod[c1, 7];

       i1 = Mod[d1, 7];

        j1 = Mod[k1, 7];

         l1 = Mod[c1, 4];

          m1 = Mod[d1, 4];

           o1 = Mod[k1, 4];

            r1 = Mod[c1, 5];

             s1 = Mod[d1, 5];

              t1 = Mod[k1, 5];

               pp1 = {e1, f1, g1, h1, i1, j1, l1, m1, o1, r1, s1, t1};

                MemberQ[QQ, pp1]  ] &];

                validNumbers


oddNumbers1 = Select[validNumbers, OddQ];
```

```
validNumbers = Select[oddNumbers1, Mod[2^#, #] == 2 &];


validNumbers
 nn = Range[1, 10000000];n = Select[nn, PrimeQ, (1000)];
k = (n^2) - 1 + n + (2 - 4 n);d = n^4 - 1 + n^2;c = n^3 + 2;e = Mod[c, 3];
f = Mod[d, 3];
g = Mod[k, 3];
h = Mod[c, 7];
i = Mod[d, 7];
j = Mod[k, 7];
l = Mod[c, 4];
m = Mod[d, 4];
o = Mod[k, 4];
r = Mod[c, 5];
s = Mod[d, 5];
t = Mod[k, 5];
QQ = Transpose[{e, f, g, h, i, j, l, m, o, r, s, t}];
validNumbers = Select[Range[7963, 8050],   Module[{n2 = #, k1, d1, c1, e1, f1, g1, h1, i1, j1, l1, m1, o1, r1, s1, t1, pp1},    k1 = (n2^2) - 1 + n2 + (2 - 4 n2);
  d1 = n2^4 - 1 + n2^2;
    c1 = n2^3 + 2;
      e1 = Mod[c1, 3];
        f1 = Mod[d1, 3];
          g1 = Mod[k1, 3];
            h1 = Mod[c1, 7];
              i1 = Mod[d1, 7];
                j1 = Mod[k1, 7];
                  l1 = Mod[c1, 4];
                    m1 = Mod[d1, 4];
                      o1 = Mod[k1, 4];
                        r1 = Mod[c1, 5];
```

```
s1 = Mod[d1, 5];
  t1 = Mod[k1, 5];
    pp1 = {e1, f1, g1, h1, i1, j1, l1, m1, o1, r1, s1, t1};
      MemberQ[QQ, pp1]  ] &];
      validNumbers


oddNumbers = Select[validNumbers, OddQ];
validNumbers = Select[oddNumbers, Mod[2^#, #] == 2 &];


validNumbers
validNumbers2=Intersection[oddNumbers,oddNumbers1]
validNumbers = Select[validNumbers2, Mod[2^#, #] == 2 &]
validNumbers
```

{7963,7965,7967,7969,7971,7973,7975,7977,7979,7981,7983,7985,7987,7989,7991,7993,7995,7997,7999,8001,8003,8005,8007,8009,8011,8013,8015,8017,8019,8021,8023,8025,8027,8029,8031,8033,8035,8037,8039,8041,8043,8045,8047,8049}

{7963,7993,8009,8011,8017,8039}

{7963,7967,7969,7979,7981,7982,7983,7985,7987,7991,7993,7997,7999,8003,8009,8011,8017,8021,8023,8027,8033,8039,8041,8047}

{7963,7993,8009,8011,8017,8039}

{7963,7967,7969,7979,7981,7983,7985,7987,7991,7993,7997,7999,8003,8009,8011,8017,8021,8023,8027,8033,8039,8041,8047}

{7963,7993,8009,8011,8017,8039}

Now observe the following sequence of pairs that satisfy the rule stablished in RULE 1

pairs = {{12, 5}, {20, 13}, {26, 19}, {30, 23}, {42, 35}, {44, 37}, {56, 49}, {86, 79}, {102, 95}, {104, 97}, {110, 103}, {132, 125}, {146, 139}, {152, 145}, {162, 155}, {174, 167}, {180, 173}, {182, 175}, {186, 179}, {194, 187}, {204, 197}, {210, 203}, {216, 209}, {240, 233}, {254, 247}, {260, 253}, {264, 257}, {272, 265}, {284, 277}, {302, 295}, {312, 305}, {314, 307}, {324, 317}, {326, 319}, {330, 323}, {336, 329}, {356, 349}, {362, 355}, {366, 359}, {380, 373}, {384, 377}, {386, 379}, {390, 383}, {404, 397}, {410, 403}, {422, 415}, {446, 439}, {456, 449}, {462, 455}, {470, 463}, {480, 473}, {482, 475}, {512, 505}, {516, 509}, {522, 515}, {524, 517}, {536, 529}, {540, 533}, {554, 547}, {560, 553}, {594, 587}};

result = FoldList[#2 - 12 &, Last[pairs][[1]], Reverse[Most[pairs]][[All, 1]]]

a=Differences[result]

b=a*-1

c=Reverse[b]

numbers = c

result = FoldList[Plus, 12, numbers]

and then check for the results...

{594,548,542,528,524,512,510,504,500,470,468,458,450,444,434,410,398,392,378,374,372,368,354,350,344,324,318,314,312,302,300,290,272,260,252,248,242,228,204,198,192,182,174,170,168,162,150,140,134,120,98,92,90,74,44,32,30,18,14,8,0}

{-46,-6,-14,-4,-12,-2,-6,-4,-30,-2,-10,-8,-6,-10,-24,-12,-6,-14,-4,-2,-4,-14,-4,-6,-20,-6,-4,-2,-10,-2,-10,-18,-12,-8,-4,-6,-14,-24,-6,-6,-10,-8,-4,-2,-6,-12,-10,-6,-14,-22,-6,-2,-16,-30,-12,-2,-12,-4,-6,-8}

{46,6,14,4,12,2,6,4,30,2,10,8,6,10,24,12,6,14,4,2,4,14,4,6,20,6,4,2,10,2,10,18,12,8,4,6,14,24,6,6,10,8,4,2,6,12,10,6,14,22,6,2,16,30,12,2,12,4,6,8}

{8,6,4,12,2,12,30,16,2,6,22,14,6,10,12,6,2,4,8,10,6,6,24,14,6,4,8,12,18,10,2,10,2,4,6,20,6,4,14,4,2,4,14,6,12,24,10,6,8,10,2,30,4,6,2,12,4,14,6,46}

{8,6,4,12,2,12,30,16,2,6,22,14,6,10,12,6,2,4,8,10,6,6,24,14,6,4,8,12,18,10,2,10,2,4,6,20,6,4,14,4,2,4,14,6,12,24,10,6,8,10,2,30,4,6,2,12,4,14,6,46}

{12,20,26,30,42,44,56,86,102,104,110,132,146,152,162,174,180,182,186,194,204,210,216,240,254,260,264,272,284,302,312,314,324,326,330,336,356,362,366,380,384,386,390,404,410,422,446,456,462,470,480,482,512,516,522,524,536,540,554,560,606} these are the even parto f the pairs that satsify RULE 1. Subtract 7 from the even numbers and you get the odd parto f the oredered pairs.

Now just to clarify the number 914 used in the equation of z in RULE 1 comes from subtracting the 999th prime number from the multiplication of 7*999, which is 7907-(7*999)=914