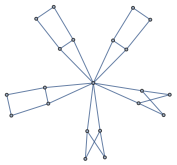
In[ ]:= theonlyvalid21 =  ;

adj21 = AdjacencyMatrix[theonlyvalid21];

In[ ]:= Length[all2560]

Out[ ]= 2560

In[ ]:= Jacobi[x_, n_, matn_] := (-22 + x) (-2 + x)^42 (6 + x)^15 (8 + x)^2 * Det[
$$\frac{x+4}{(x+6)\,(x-2)}\,\text{IdentityMatrix}[n] + \frac{\text{matn}}{(x+6)\,(x-2)} + \frac{9\,\text{ConstantArray}[1,\{n,n\}]}{(x+6)\,(x-2)\,(x-22)} + \frac{(\text{residuemat} * (x-14))[\![\text{Range}[n],\text{Range}[n]]\!] + \text{RA}[\![\text{Range}[n],\text{Range}[n]]\!]}{(x+8)\,(x+6)\,(x-2)\,(x-22)}\Big];$$

In[ ]:= Jacobi[53, 21, adj21]

Out[ ]= 16 235 399 957 685 910 857 160 339 368 675 855 206 433 975 230 193 151 623 129 978 226 875

In[ ]:= coclique22all = {};
For[j = 1, j ≤ 2560, j++,
  mat = ConstantArray[0, {22, 22}];
  mat[[Range[21], Range[21]]] = adj21;
  mat[[22, Range[20]]] = all2560[[j]];
  mat[[Range[20], 22]] = all2560[[j]];
  If[IntegerQ[Jacobi[53, 22, mat]], AppendTo[coclique22all, mat]]
 ] // AbsoluteTiming
coclique22all // Length

Out[ ]= {3.10365, Null}

Out[ ]= 454

In[ ]:= coclique22graphs = Array[coclique22g, Length[coclique22all]];
For[i = 1, i ≤ Length[coclique22all], i++,
 coclique22graphs[[i]] = AdjacencyGraph[coclique22all[[i]]]
]
coclique22 = DeleteDuplicatesBy[coclique22graphs, CanonicalGraph];
Length[coclique22]

Out[ ]= 7

In[ ]:=
```
all454 = {};
For[j = 1, j ≤ 2560, j++,
  mat = ConstantArray[0, {22, 22}];
  mat[[Range[21], Range[21]]] = adj21;
  mat[[22, Range[20]]] = all2560[[j]];
  mat[[Range[20], 22]] = all2560[[j]];
  If[IntegerQ[Jacobi[53, 22, mat]], AppendTo[all454, all2560[[j]]]]
 ] // AbsoluteTiming
all454 // Length
```

Out[ ]= {3.185, Null}

Out[ ]= 454

In[ ]:=
```
all454 = {{0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0},
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```

```
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```

```
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{1, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1},
{1, 1, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1},
{1, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 1, 0},
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{1, 1, 0, 0, 1, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1},
{1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 1, 0, 1, 0, 1}};
```

In[ ]:= `Length[all454]`

Out[ ]= 454

In[ ]:=
```
coclique22all // Length
```

Out[ ]=
```
454
```

In[ ]:=
```
coclique23allfrom22all = {};
For[i = 1, i ≤ 454, i++,
  n = 23;
  If[Mod[i, 10] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = coclique22all[[i]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique23allfrom22all, mat]]
  ]
 ] // AbsoluteTiming
coclique23allfrom22all // Length
```

```
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
```

```
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
```

Out[ ]= {300.39, Null}

Out[ ]= 37 080

In[ ]:=
```
coclique23graphsfrom22all =
  Array[coclique23g22all, Length[coclique23allfrom22all]];
For[i = 1, i ≤ Length[coclique23allfrom22all], i++,
 coclique23graphsfrom22all[[i]] = AdjacencyGraph[coclique23allfrom22all[[i]]]
]
coclique23from22all =
  DeleteDuplicatesBy[coclique23graphsfrom22all, CanonicalGraph];
Length[coclique23from22all]
```

Out[ ]= 30

In[ ]:=
```
coclique23all = {};
For[i = 1, i ≤ 7, i++,
  n = 23;
  Print[i];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique22[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique23all, mat]]
  ]
 ] // AbsoluteTiming
coclique23all // Length
```

```
1
2
3
4
5
6
7
```

Out[ ]= {4.25689, Null}

Out[ ]= 1556

In[ ]:=
```
coclique23graphs = Array[coclique23g, Length[coclique23all]];
For[i = 1, i ≤ Length[coclique23all], i++,
 coclique23graphs[[i]] = AdjacencyGraph[coclique23all[[i]]]
]
coclique23 = DeleteDuplicatesBy[coclique23graphs, CanonicalGraph];
Length[coclique23]
```

Out[ ]= 30

In[ ]:=
```
coclique24all454 = {};
For[i = 1, i ≤ 30, i++,
  n = 24;
  If[Mod[i, 3] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique23[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique24all454, mat]]
  ]
 ] // AbsoluteTiming
coclique24all454 // Length
```

```
3
6
9
12
15
18
21
24
27
30
```

Out[ ]= {20.0645, Null}

Out[ ]= 2924

In[ ]:=
```
coclique24all2560 = {};
For[i = 1, i ≤ 30, i++,
  n = 24;
  If[Mod[i, 3] == 0, Print[i]];
  For[j = 1, j ≤ 2560, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique23[[i]]];
   mat[[n, Range[20]]] = all2560[[j]];
   mat[[Range[20], n]] = all2560[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique24all2560, mat]]
  ]
 ] // AbsoluteTiming
coclique24all2560 // Length
```

3

6

9

12

15

18

21

24

27

30

Out[ ]= {120.922, Null}

Out[ ]= 3004

In[ ]:= **Intersection[coclique24all454, coclique24all2560] // Length**

Out[ ]= 2924

In[ ]:= **Complement[coclique24all2560, coclique24all454] // Length**

Out[ ]= 80

In[ ]:= **coclique23[[9]] // AdjacencyMatrix // MatrixForm**

Out[ ]//MatrixForm=

$$\begin{pmatrix}
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0\\
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1&0&1&\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&0&\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&\\
0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&1&0&1&\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&1&1&\\
0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&0&\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0\\
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0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0\\
1&1&0&0&1&1&0&0&1&1&0&0&1&0&1&0&1&0&1&0&0&0&0\\
0&0&1&1&0&1&1&0&0&1&1&0&1&0&1&0&1&0&1&0&0&0&0\\
0&0&1&1&1&0&0&1&1&1&0&0&0&1&0&1&1&0&1&0&0&0&0
\end{pmatrix}$$

In[ ]:= `Complement[coclique24all2560, coclique24all454][[1]] // MatrixForm`

Out[ ]//MatrixForm=

$$\begin{pmatrix}
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&0\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&0\\
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&1\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&0&1&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&1&1&1\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&0&0&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&1&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0\\
1&1&0&0&1&1&0&0&1&1&0&0&1&0&1&0&1&0&1&0&0&0&0&0\\
0&0&1&1&0&1&1&0&0&1&1&0&1&0&1&0&1&0&1&0&0&0&0&0\\
0&0&1&1&1&0&0&1&1&1&0&0&0&1&0&1&1&0&1&0&0&0&0&0\\
0&0&1&1&0&1&1&0&0&1&0&1&0&0&1&1&1&0&1&0&0&0&0&0
\end{pmatrix}$$

In[ ]:= `A =` $\begin{pmatrix}
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&0\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&0\\
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&1\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&0&1&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&1&1&1\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&0&0&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&1&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&1&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0\\
1&1&0&0&1&1&0&0&1&1&0&0&1&0&1&0&1&0&1&0&0&0&0&0\\
0&0&1&1&0&1&1&0&0&1&1&0&1&0&1&0&1&0&1&0&0&0&0&0\\
0&0&1&1&1&0&0&1&1&1&0&0&0&1&0&1&1&0&1&0&0&0&0&0\\
0&0&1&1&0&1&1&0&0&1&0&1&0&0&1&1&1&0&1&0&0&0&0&0
\end{pmatrix}$ ;

In[ ]:= `Range[24]`

Out[ ]= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24}

In[ ]:=
```
ran = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24};
```

In[ ]:=
```
Jacobi[53, 21, A[[ran, ran]]]
```

Out[ ]=
```
16 235 399 957 685 910 857 160 339 368 675 855 206 433 975 230 193 151 623 129 978 226 875
```

In[ ]:=
```
coclique24graphs454 = Array[coclique24g, Length[coclique24all454]];
For[i = 1, i ≤ Length[coclique24all454], i++,
 coclique24graphs454[[i]] = AdjacencyGraph[coclique24all454[[i]]]
]
coclique24n454 = DeleteDuplicatesBy[coclique24graphs454, CanonicalGraph];
Length[coclique24n454]
```

Out[ ]=
```
171
```

In[ ]:=
```
coclique24graphs2560 = Array[coclique24g, Length[coclique24all2560]];
For[i = 1, i ≤ Length[coclique24all2560], i++,
 coclique24graphs2560[[i]] = AdjacencyGraph[coclique24all2560[[i]]]
]
coclique24n2560 = DeleteDuplicatesBy[coclique24graphs2560, CanonicalGraph];
Length[coclique24n2560]
```

Out[ ]=
```
187
```

In[ ]:=
```
coclique24refined = {};
For[i = 1, i ≤ Length[coclique24], i++,
  If[Mod[i, 4] == 0, Print[i]];
  If[PolynomialQ[Jacobi[x, 24, AdjacencyMatrix[coclique24[[i]]]] // Factor, x],
   AppendTo[coclique24refined, coclique24[[i]]]
 ] // AbsoluteTiming
coclique24refined // Length
```

```
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
```

```
68
72
76
80
84
88
92
96
100
104
108
112
116
120
124
128
132
136
140
144
148
152
156
160
164
168
172
176
180
184
```

Out[ ]= {152.077, Null}

Out[ ]= 171

In[ ]:=
```
coclique25all = {};
For[i = 1, i ≤ 171, i++,
  n = 25;
  If[Mod[i, 5] == 0, Print[i]];
  For[j = 1, j ≤ 2560, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique24refined[[i]]];
   mat[[n, Range[20]]] = all2560[[j]];
   mat[[Range[20], n]] = all2560[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique25all, mat]]
  ]
 ] // AbsoluteTiming
coclique25all // Length
```

```
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
```

Out[ ]= {890.125, Null}

Out[ ]= 6608

In[ ]:=
```
coclique25graphs = Array[coclique25g, Length[coclique25all]];
For[i = 1, i ≤ Length[coclique25all], i++,
 coclique25graphs[[i]] = AdjacencyGraph[coclique25all[[i]]]
]
coclique25 = DeleteDuplicatesBy[coclique25graphs, CanonicalGraph];
Length[coclique25]
```

Out[ ]= 467

In[ ]:=
```
coclique25refined = {};
For[i = 1, i ≤ Length[coclique25], i++,
  If[Mod[i, 10] == 0, Print[i]];
  If[PolynomialQ[Jacobi[x, 25, AdjacencyMatrix[coclique25[[i]]]] // Factor, x],
   AppendTo[coclique25refined, coclique25[[i]]]
 ] // AbsoluteTiming
coclique25refined // Length
```

```
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
```

```
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
```

Out[ ]= {491.361, Null}

Out[ ]= 467

In[ ]:=
```
coclique26all = {};
For[i = 1, i ≤ 467, i++,
  n = 26;
  If[Mod[i, 15] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique25refined[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique26all, mat]]
  ]
 ] // AbsoluteTiming
coclique26all // Length
```

```
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
360
375
390
405
420
435
450
465
```

Out[ ]= {461.459, Null}

Out[ ]= 6706

In[ ]:=
```
coclique26graphs = Array[coclique26g, Length[coclique26all]];
For[i = 1, i ≤ Length[coclique26all], i++,
 coclique26graphs[[i]] = AdjacencyGraph[coclique26all[[i]]]
]
coclique26 = DeleteDuplicatesBy[coclique26graphs, CanonicalGraph];
Length[coclique26]
```

Out[ ]=
```
1007
```

In[ ]:=
```
coclique26refined = {};
For[i = 1, i ≤ Length[coclique26], i++,
  If[Mod[i, 20] == 0, Print[i]];
  If[PolynomialQ[Jacobi[x, 26, AdjacencyMatrix[coclique26[[i]]]] // Factor, x],
   AppendTo[coclique26refined, coclique26[[i]]]
 ] // AbsoluteTiming
coclique26refined // Length
```

```
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
```

```
540
560
580
600
620
640
660
680
700
720
740
760
780
800
820
840
860
880
900
920
940
960
980
1000
```

Out[ ]= {1312.64, Null}

Out[ ]= 965

In[ ]:=
```
coclique27all = {};
For[i = 1, i ≤ 965, i++,
  n = 27;
  If[Mod[i, 20] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique26refined[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique27all, mat]]
  ]
 ] // AbsoluteTiming
coclique27all // Length
```

```
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
```

```
580
600
620
640
660
680
700
720
740
760
780
800
820
840
860
880
900
920
940
960
```

Out[ ]= {985.47, Null}

Out[ ]= 7140

In[ ]:=
```
coclique27graphs = Array[coclique27g, Length[coclique27all]];
For[i = 1, i ≤ Length[coclique27all], i++,
 coclique27graphs[[i]] = AdjacencyGraph[coclique27all[[i]]]
]
coclique27 = DeleteDuplicatesBy[coclique27graphs, CanonicalGraph];
Length[coclique27]
```

Out[ ]= 1113

In[ ]:=
```
coclique27refined = {};
For[i = 1, i ≤ Length[coclique27], i++,
  If[Mod[i, 20] == 0, Print[i]];
  If[PolynomialQ[Jacobi[x, 27, AdjacencyMatrix[coclique27[[i]]]] // Factor, x],
   AppendTo[coclique27refined, coclique27[[i]]]
 ] // AbsoluteTiming
coclique27refined // Length
```

```
20
40
60
80
```

100

120

140

160

180

200

220

240

260

280

300

320

340

360

380

400

420

440

460

480

500

520

540

560

580

600

620

640

660

680

700

720

740

760

780

800

820

840

860

```
880
900
920
940
960
980
1000
1020
1040
1060
1080
1100
```

Out[ ]= {1721.29, Null}

Out[ ]= 879

In[ ]:=
```
coclique28all = {};
For[i = 1, i ≤ 879, i++,
  n = 28;
  If[Mod[i, 20] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique27refined[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique28all, mat]]
  ]
 ] // AbsoluteTiming
coclique28all // Length
```

```
20
40
60
80
100
120
140
160
180
200
```

```
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
580
600
620
640
660
680
700
720
740
760
780
800
820
840
860
```

Out[ ]= {991.886, Null}

Out[ ]= 2030

In[ ]:=
```
coclique28graphs = Array[coclique28g, Length[coclique28all]];
For[i = 1, i ≤ Length[coclique28all], i++,
 coclique28graphs[[i]] = AdjacencyGraph[coclique28all[[i]]]
]
coclique28 = DeleteDuplicatesBy[coclique28graphs, CanonicalGraph];
Length[coclique28]
```

Out[ ]=
```
665
```

In[ ]:=
```
coclique28refined = {};
For[i = 1, i ≤ Length[coclique28], i++,
  If[Mod[i, 15] == 0, Print[i]];
  If[PolynomialQ[Jacobi[x, 28, AdjacencyMatrix[coclique28[[i]]]] // Factor, x],
   AppendTo[coclique28refined, coclique28[[i]]]
 ] // AbsoluteTiming
coclique28refined // Length
```

```
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
360
375
390
```

```
405
420
435
450
465
480
495
510
525
540
555
570
585
600
615
630
645
660
```

Out[ ]= {1172.59, Null}

Out[ ]= 417

In[ ]:=
```
deg10n29 = {};
For[i = 1, i ≤ 417, i++,
 val = AdjacencyMatrix[coclique28refined[[i]]].ConstantArray[1, 28];
 For[j = 1, j ≤ 20, j++,
  If[val[[j]] == 10, AppendTo[deg10n29, i];
   Print[i, " ", val]; Break[]]
 ]
]
deg10n29 // Length
```

```
43 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
46 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 2, 10, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
47 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
49 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
50 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
53 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}
61 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 2, 10, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
62 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
63 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 2, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
66 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 2, 10, 2, 10, 10, 10, 10, 10, 10, 10, 10}
125 {4, 8, 4, 8, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
```

139 {4, 8, 4, 8, 6, 6, 6, 6, 6, 8, 6, 4, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

141 {4, 8, 4, 8, 6, 6, 6, 6, 6, 8, 6, 4, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

152 {6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 6, 8, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}

153
{6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

154 {6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

155 {6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 6, 8, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}

156 {6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}

158
{6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

159 {6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}

160 {6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 6, 6, 6, 6, 6, 2, 10, 6, 10, 10, 10, 10, 10, 10, 10, 10}

162 {6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

165 {6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

167 {6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 6, 6, 6, 6, 6, 2, 10, 6, 10, 10, 10, 10, 10, 10, 10, 10}

171 {6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 8, 2, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

177
{6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 2, 10, 2, 10, 10, 10, 10, 10, 10, 10, 10}

178 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

183 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

184 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

185 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

193 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

194 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

195 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

199 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 10, 2, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

201 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 10, 2, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

213 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 2, 6, 4, 6, 8, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

215 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 2, 6, 4, 6, 8, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

221 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

240 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

241 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

242 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}

244 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}

253
{6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

256
{6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}

259 {4, 8, 4, 8, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}

270 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}

```
273 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}
291 {6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
292 {6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
293 {6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
299 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 2, 10, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10, 10}
300
 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
301 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 2, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10}
364
 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 2, 10, 2, 10, 10, 10, 10, 10, 10, 10, 10}
365 {6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
373 {6, 6, 6, 6, 4, 8, 4, 8, 6, 8, 6, 4, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
377 {6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 4, 6, 8, 6, 8, 4, 8, 4, 10, 10, 10, 10, 10, 10, 10}
378
 {6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
379 {6, 6, 6, 6, 6, 6, 6, 6, 6, 4, 10, 4, 6, 6, 6, 6, 6, 8, 2, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10}
382 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
383 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
384 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
388 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 6, 6, 6, 6, 6, 2, 10, 6, 10, 10, 10, 10, 10, 10, 10, 10}
389 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 8, 6, 4, 4, 6, 8, 6, 6, 4, 10, 4, 10, 10, 10, 10, 10, 10, 10, 10}
395 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
405 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
406 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
416 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
417 {6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 10, 6, 2, 6, 6, 6, 6, 6, 6, 6, 6, 10, 10, 10, 10, 10, 10, 10, 10}
```

Out[ ]= 69

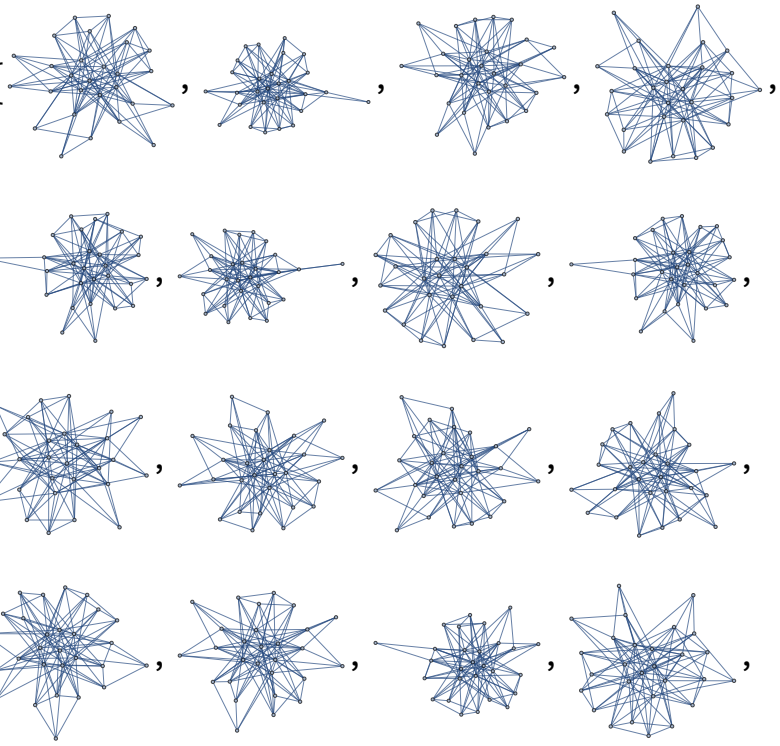
In[ ]:= **deg10n29**

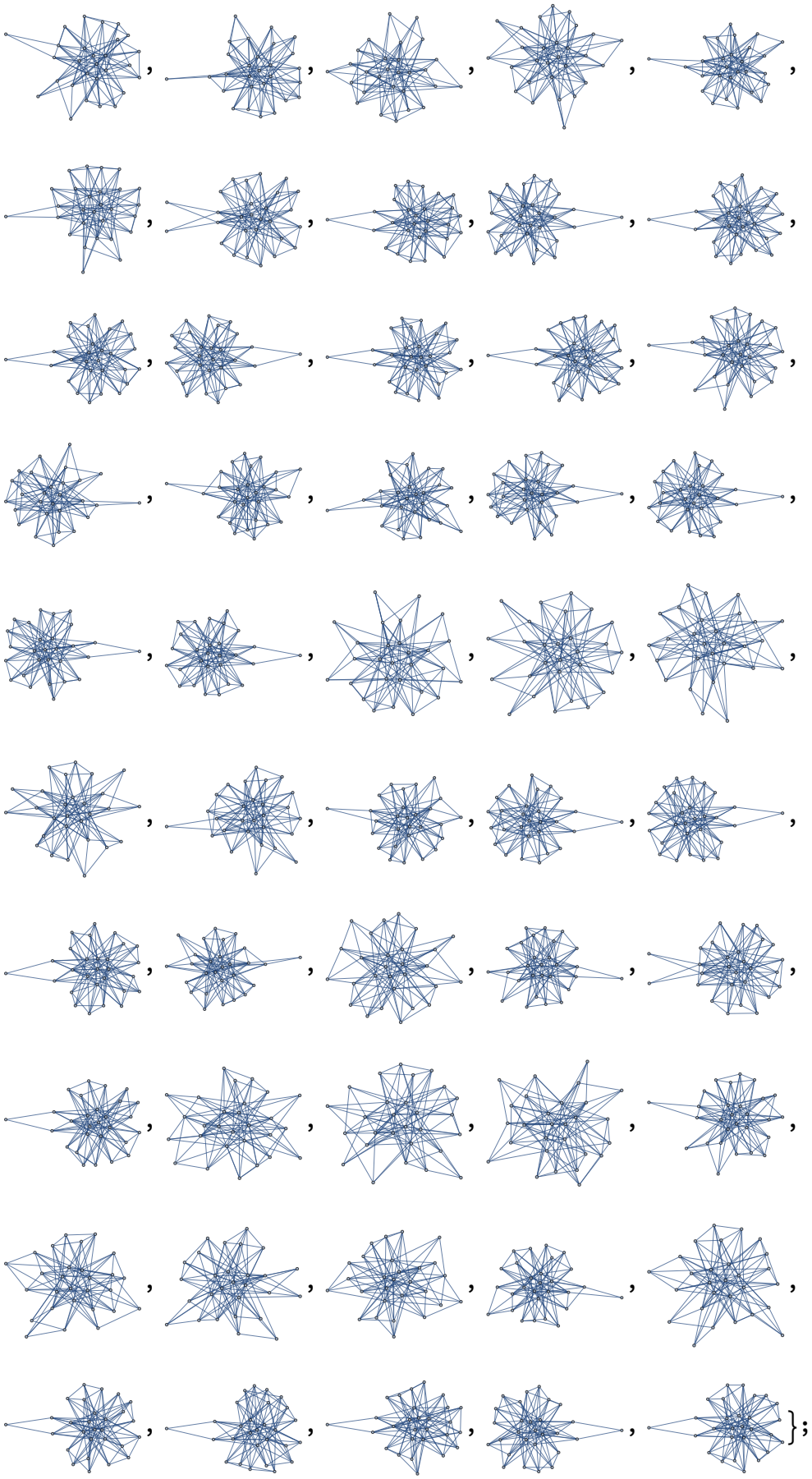
Out[ ]= {43, 46, 47, 49, 50, 53, 61, 62, 63, 66, 125, 139, 141, 152, 153, 154, 155, 156, 158, 159, 160, 162, 165, 167, 171, 177, 178, 183, 184, 185, 193, 194, 195, 199, 201, 213, 215, 221, 240, 241, 242, 244, 253, 256, 259, 270, 273, 291, 292, 293, 299, 300, 301, 364, 365, 373, 377, 378, 379, 382, 383, 384, 388, 389, 395, 405, 406, 416, 417}

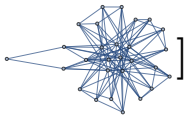
In[ ]:= `coclique28refined[[405]] // AdjacencyMatrix // MatrixForm`

Out[ ]//MatrixForm=

$$\begin{pmatrix}
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&0&0&1&1&1\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&1&1&0&0&1\\
0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&0&1&1&0\\
1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&0&0&0\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&1&0&1&0\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&1&0&1&0&0\\
0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&1&0&0&1&0&1&1\\
0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&0&1&0&1\\
0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&1&1&1&0&0&0&0&1\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&1&1&1&1&1&1&1&1\\
0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&0\\
0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&0&1&0&0&1&1&0\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&1&0&0&1&0&1&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&1&0&1&1&1&0&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&0&0&0&1&0&1&0&1&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&0&0&1&1&0&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&1&0&1&1&0&1\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&1&1&0&1&0&0&1&0\\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&0&1&0&0&0&1&1&0&0&1&1\\
1&1&0&0&1&1&0&0&1&1&0&0&1&0&1&0&1&0&1&0&0&0&0&0&0&0&0&0&0\\
0&0&1&1&0&1&1&0&1&1&0&0&0&1&0&1&1&0&1&0&0&0&0&0&0&0&0&0&0\\
0&0&1&1&1&0&0&1&1&1&0&0&1&0&1&0&0&1&0&1&0&0&0&0&0&0&0&0&0\\
0&1&0&1&0&1&0&1&0&1&1&0&0&0&1&1&0&0&1&1&0&0&0&0&0&0&0&0&0\\
0&1&0&1&1&0&1&0&0&1&1&0&0&1&1&0&1&1&0&0&0&0&0&0&0&0&0&0&0\\
1&0&1&0&0&1&0&1&0&1&1&0&1&0&0&1&1&1&0&0&0&0&0&0&0&0&0&0&0\\
1&0&1&0&1&0&1&0&0&1&1&0&1&1&0&0&0&0&1&1&0&0&0&0&0&0&0&0&0\\
1&1&0&0&0&0&1&1&1&1&0&0&0&1&0&1&0&1&0&1&0&0&0&0&0&0&0&0&0
\end{pmatrix}$$

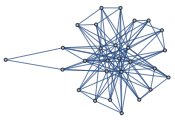
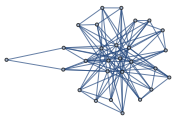
In[ ]:= `coclique28deg10 = {`  `}`



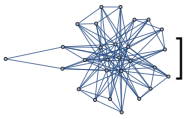
In[ ]:= AdjacencyMatrix[  ] // MatrixForm

Out[ ]//MatrixForm=

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

In[ ]:= FindGraphIsomorphism[  ,  , All]

Out[ ]= { ⟨| 1 → 1, 2 → 2, 3 → 3, 4 → 4, 5 → 5, 6 → 6, 7 → 7, 8 → 8, 9 → 9, 10 → 10, 11 → 11,
12 → 12, 13 → 13, 14 → 14, 15 → 15, 16 → 16, 17 → 17, 18 → 18, 19 → 19, 20 → 20,
21 → 21, 22 → 22, 23 → 23, 24 → 24, 25 → 25, 26 → 26, 27 → 27, 28 → 28 |⟩,
⟨| 1 → 5, 2 → 6, 3 → 7, 4 → 8, 5 → 1, 6 → 2, 7 → 3, 8 → 4, 9 → 9, 10 → 10, 11 → 11,
12 → 12, 13 → 17, 14 → 18, 15 → 19, 16 → 20, 17 → 13, 18 → 14, 19 → 15, 20 → 16,
21 → 21, 22 → 25, 23 → 23, 24 → 27, 25 → 22, 26 → 26, 27 → 24, 28 → 28 |⟩,
⟨| 1 → 16, 2 → 15, 3 → 14, 4 → 13, 5 → 20, 6 → 19, 7 → 18, 8 → 17, 9 → 11, 10 → 10,
11 → 9, 12 → 12, 13 → 8, 14 → 7, 15 → 6, 16 → 5, 17 → 4, 18 → 3, 19 → 2, 20 → 1,
21 → 23, 22 → 24, 23 → 21, 24 → 25, 25 → 27, 26 → 28, 27 → 22, 28 → 26 |⟩,
⟨| 1 → 20, 2 → 19, 3 → 18, 4 → 17, 5 → 16, 6 → 15, 7 → 14, 8 → 13, 9 → 11, 10 → 10,
11 → 9, 12 → 12, 13 → 4, 14 → 3, 15 → 2, 16 → 1, 17 → 8, 18 → 7, 19 → 6, 20 → 5,
21 → 23, 22 → 27, 23 → 21, 24 → 22, 25 → 24, 26 → 28, 27 → 25, 28 → 26 |⟩ }

In[ ]:=
```
GraphAutomorphismGroup[ ]
```


Out[ ]=
```
PermutationGroup[
 {Cycles[{{1, 5}, {2, 6}, {3, 7}, {4, 8}, {13, 17}, {14, 18}, {15, 19}, {16, 20},
    {22, 25}, {24, 27}}], Cycles[{{1, 16, 5, 20}, {2, 15, 6, 19}, {3, 14, 7, 18},
    {4, 13, 8, 17}, {9, 11}, {21, 23}, {22, 24, 25, 27}, {26, 28}}]}]
```

In[ ]:=
```
GroupOrder[%6]
```

Out[ ]=
```
4
```

In[ ]:=
```
coclique29all = {};
For[i = 1, i ≤ 417, i++,
  n = 29;
  If[Mod[i, 15] == 0, Print[i]];
  For[j = 1, j ≤ 454, j++,
   mat = ConstantArray[0, {n, n}];
   mat[[Range[n - 1], Range[n - 1]]] = AdjacencyMatrix[coclique28refined[[i]]];
   mat[[n, Range[20]]] = all454[[j]];
   mat[[Range[20], n]] = all454[[j]];
   If[IntegerQ[Jacobi[53, n, mat]], AppendTo[coclique29all, mat]]
  ]
 ] // AbsoluteTiming
coclique29all // Length
```

```
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
360
375
390
405
```

Out[ ]= {516.183, Null}

Out[ ]= 128

In[ ]:=
```
coclique29graphs = Array[coclique29g, Length[coclique29all]];
For[i = 1, i ≤ Length[coclique29all], i++,
 coclique29graphs[[i]] = AdjacencyGraph[coclique29all[[i]]]
]
coclique29 = DeleteDuplicatesBy[coclique29graphs, CanonicalGraph];
Length[coclique29]
```

Out[ ]= 56

In[ ]:=
```
AdjacencyMatrix[coclique29[[56]]].ConstantArray[1, 29]
```

Out[ ]= {4, 7, 5, 10, 7, 8, 5, 6, 8, 7, 6, 5, 8, 4,
 7, 7, 7, 5, 8, 6, 10, 10, 10, 10, 10, 10, 10, 10, 10}

```
In[ ]:= Jacobi[53, 29, AdjacencyMatrix[coclique29[[56]]]]
        Jacobi[x, 29, AdjacencyMatrix[coclique29[[56]]] // Factor
```

```
Out[ ]= 270 260 461 526 483 871 266 743 056 343 762 377 305 573 244 790 078 125
```

$$\text{Out[ ]=}\ \frac{1}{(6+x)^2}(-2+x)^{14}(2+x)^3(4+x)\left(2+4x+x^2\right)^2 \left(36\,096+139\,200\,x+72\,352\,x^2-207\,392\,x^3-336\,000\,x^4-218\,340\,x^5-74\,364\,x^6-12\,986\,x^7-686\,x^8+128\,x^9+22\,x^{10}+x^{11}\right)$$

```
In[ ]:= coclique29refined = {};
        For[i = 1, i ≤ Length[coclique29], i++,
          If[Mod[i, 4] == 0, Print[i]];
          If[PolynomialQ[Jacobi[x, 29, AdjacencyMatrix[coclique29[[i]]]] // Factor, x],
           AppendTo[coclique29refined, coclique29[[i]]]
         ] // AbsoluteTiming
        coclique29refined // Length
```

```
4
8
12
16
20
24
28
32
36
40
44
48
52
56
```

```
Out[ ]= {113.802, Null}
```

```
Out[ ]= 0
```

```
In[ ]:= Length[coclique29all]
```

```
Out[ ]= 128
```

```
In[ ]:= coclique29nomodiso = {};
        For[i = 1, i ≤ Length[coclique29all], i++,
          If[Mod[i, 4] == 0, Print[i]];
          If[PolynomialQ[Jacobi[x, 29, coclique29all[[i]]] // Factor, x],
           AppendTo[coclique29nomodiso, coclique29all[[i]]]
         ] // AbsoluteTiming
        coclique29nomodiso // Length
```

```
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
84
88
92
96
100
104
108
112
116
120
124
128
```

Out[ ]= {260.534, Null}

Out[ ]= 0