

```

SetDirectory["C:/drorbn/AcademicPensieve/Projects/Arrow_Diagrams_and_gl(N)"];
<< "Arrow_Diagrams_and_gl(N).m"
base = 10;

diag = BasisAArrow[4][[120]]
Diag[ar[4, 7], ar[5, 3], ar[6, 2], ar[8, 1]]

diag3 = BasisAArrow[3][[12]]
Diag[ar[3, 4], ar[5, 1], ar[6, 2]]

UGLnBiAlg[diag3]

```

A very large output was generated. Here is a sample of it:

$$\begin{aligned}
& -\frac{1}{8} n h[1]^2 RW[] + 4 n^2 RW[11] + 10 n^3 RW[11] + \ll 2397 \gg + 6 n^5 RW[15, 25, 34, 43, 51, 52] + \\
& 6 n^6 RW[15, 26, 34, 43, 51, 62] + 6 n^6 RW[16, 23, 32, 45, 54, 61] + \\
& 6 n^6 RW[16, 24, 35, 42, 53, 61] + 6 n^6 RW[16, 25, 34, 43, 52, 61]
\end{aligned}$$

Show Less Show More Show Full Output Set Size Limit...

```

U[deg_, diag_] := Expand[Plus[
  UGLnBiAlg[diag] /. n^p_. * RW[l___] => EW[n^p * FromDigits[{1}, base^2]] //.
  h[i_]^p_. EW[l_] => EW[h[i]^p l],
  Coproduct[diag, 1] /. T[d1_, d2_] => Distribute[T[UGLnBiAlg[d1], UGLnBiAlg[d2]]] /.
  T[c_?NumberQ * a1_, a2_] => c * T[a1, a2] /.
  T[a1_, c_?NumberQ * a2_] => c * T[a1, a2] /. T[a1_, a2_] => EW[1, a1, a2],
  Coproduct[diag, 2] /. T[d1_, d2_] => Distribute[T[UGLnBiAlg[d1], UGLnBiAlg[d2]]] /.
  T[c_?NumberQ * a1_, a2_] => c * T[a1, a2] /.
  T[a1_, c_?NumberQ * a2_] => c * T[a1, a2] /. T[a1_, a2_] => EW[2, a1, a2]
]]

SOU[deg_, diag_] := Expand[Plus[
  USO[diag] /. n^p_. * RW[l___] => EW[n^p * FromDigits[{1}, base^2]] //.
  h[i_]^p_. EW[l_] => EW[h[i]^p l],
  (*Coproduct[diag, 1] /. T[d1_, d2_] => Distribute[T[UGLnBiAlg[d1], UGLnBiAlg[d2]]] /.
  T[c_?NumberQ * a1_, a2_] => c * T[a1, a2] /. T[a1_, c_?NumberQ * a2_] => c * T[a1, a2] /.
  T[a1_, a2_] => EW[1, a1, a2],
  Coproduct[diag, 2] /. T[d1_, d2_] => Distribute[T[UGLnBiAlg[d1], UGLnBiAlg[d2]]] /.
  T[c_?NumberQ * a1_, a2_] => c * T[a1, a2] /. T[a1_, c_?NumberQ * a2_] => c * T[a1, a2] /.
  T[a1_, a2_] => EW[2, a1, a2] *)
]]

```

**U[3, diag3]**

A very large output was generated. Here is a sample of it:

$$-\frac{EW[0]}{8} + \frac{1}{8} EW[111\ 111\ 111\ 111\ n] + 4 EW[11\ n^2] -$$

$$4 EW[22\ n^2] + \ll 3561 \gg + 4 EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[22]] +$$

$$3 EW[2, n^4 RW[14, 23, 32, 41], n RW[11, 11]] + 6 EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[12, 21]]$$

Show Less Show More Show Full Output Set Size Limit...

**vs = U[3, #] & /@ Diagrams[3 ar]**

A very large output was generated. Here is a sample of it:

$$\left\{ -\frac{EW[0]}{8} + \frac{1}{8} EW[111\ 111\ 111\ 111\ n] + 4 EW[1221\ n^2] - \right.$$

$$4 EW[111\ 221\ n^2] + \ll 855 \gg + 6 EW[2, n^4 RW[13, 24, 31, 42], n^2 RW[12, 21]] -$$

$$3 EW[2, n^4 RW[14, 23, 32, 41], n h[1]^2 RW[]] + 3 EW[2, n^4 RW[14, 23, 32, 41], n RW[11, 11]] +$$

$$\left. 6 EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[12, 21]], \ll 118 \gg, -\frac{\ll 1 \gg}{8} + \ll 3776 \gg + 6 \ll 1 \gg \right\}$$

Show Less Show More Show Full Output Set Size Limit...

**EWs = Union[Cases[vs, \_EW, Infinity]]**

A very large output was generated. Here is a sample of it:

$$\{ EW[0], EW[111\ 111\ 111\ 111\ n], EW[11\ n^2], EW[22\ n^2],$$

$$EW[1111\ n^2], \ll 2844 \gg, EW[2, n^4 RW[14, 23, 32, 41], n h[1]^2 RW[]],$$

$$EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[11]], EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[22]],$$

$$EW[2, n^4 RW[14, 23, 32, 41], n RW[11, 11]], EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[12, 21]] \}$$

Show Less Show More Show Full Output Set Size Limit...

**EWRule = Dispatch[Thread[EWs → Array[v, {Length[EWs]}]]]**

A very large output was generated. Here is a sample of it:

$$\text{Dispatch} \left\{ \{ EW[0] \rightarrow v[1], EW[111\ 111\ 111\ 111\ n] \rightarrow v[2], \right.$$

$$EW[11\ n^2] \rightarrow v[3], \ll 2848 \gg, EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[22]] \rightarrow v[2852],$$

$$EW[2, n^4 RW[14, 23, 32, 41], n RW[11, 11]] \rightarrow v[2853],$$

$$\left. EW[2, n^4 RW[14, 23, 32, 41], n^2 RW[12, 21]] \rightarrow v[2854] \right\}, -\text{DispatchTables} -$$

Show Less Show More Show Full Output Set Size Limit...

**Total[Head /@ vs]**

120 Plus

```

mat = SparseArray[
  Join @@ Table[
    t = List @@ (vs[[i]] /. EWRule);
    Replace[#, c_.*v[j_] => ({i, j} -> c)] & /@ t,
    {i, Length[vs]}
  ],
  {Length[vs], Length[EWS]}
]
SparseArray[<248 814>, {120, 2854}]

MatrixRank[mat]

27

ds = Take[BasisAArrow[3], 2];
vs = Table[
  Print[i, " ", ds[[i]]];
  U[4, ds[[i]],
  {i, Length[ds]}
];
Print["Finding EWS..."];
EWS = Union[Cases[vs, _EW, Infinity]];
EWRule = Dispatch[Thread[EWS -> Array[v, {Length[EWS]}]]];
Print["Computing mat..."];
Print[{Length[vs], Length[EWS]}];
mat = SparseArray[
  Join @@ Table[
    t = List @@ (vs[[i]] /. EWRule);
    Replace[#, c_.*v[j_] => ({i, j} -> c)] & /@ t,
    {i, Length[vs]}
  ],
  {Length[vs], Length[EWS]}
];
Print["Computing Rank..."];
MatrixRank[mat]

```

```
1 Diag[ar[4, 1], ar[5, 3], ar[6, 2]]
```

```
2 Diag[ar[1, 5], ar[3, 6], ar[4, 2]]
```

```
Finding EWs...
```

```
Computing mat...
```

```
{2, 9266}
```

SparseArray::drnk: The requested dimensions, {2, 9266}, have length inconsistent with the tensor rank (1) of the input.

```
Computing Rank...
```

A very large output was generated. Here is a sample of it:

```
MatrixRank[
  SparseArray[{-36 Binomial[n, 6] RW[101, 202, 303], -12 Binomial[n, 6] RW[101, 202, 404],
    12 Binomial[n, 6] RW[101, 202, 505], 36 Binomial[n, 6] RW[101, 202, 606],
    12 Binomial[n, 6] RW[101, 303, 404], <<15 894>>, {2, 9262} → - $\frac{1}{24}$ ,
    {2, 9263} →  $\frac{1}{24}$ , {2, 9264} →  $\frac{1}{8}$ , {2, 9265} → - $\frac{1}{8}$ , {2, 9266} →  $\frac{1}{8}$ }, {2, 9266}]]]
```

Show Less

Show More

Show Full Output

Set Size Limit...

```
ds = Take[BasisAArrow[4], All];
vs = Table[
  Print[i, " ", ds[[i]]];
  U[4, ds[[i]],
  {i, Length[ds]}
];
Print["Finding EWs..."];
EWs = Union[Cases[vs, _EW, Infinity]];
EWRule = Dispatch[Thread[EWs → Array[v, {Length[EWs]}]]];
Print["Computing mat..."];
Print[{Length[vs], Length[EWs]}];
mat = SparseArray[
  Join @@ Table[
    t = List @@ (vs[[i]] /. EWRule);
    Replace[#, c_. * v[j_] => ({i, j} → c)] & /@ t,
    {i, Length[vs]}
  ],
  {Length[vs], Length[EWs]}
];
Print["Computing Rank..."];
MatrixRank[mat]
```

```
1 Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]]
```

```
2 Diag[ar[3, 2], ar[6, 1], ar[7, 5], ar[8, 4]]
```

```
3 Diag[ar[4, 2], ar[6, 1], ar[7, 5], ar[8, 3]]
```

```
4 Diag[ar[4, 7], ar[5, 2], ar[6, 1], ar[8, 3]]
```

```
5 Diag[ar[5, 2], ar[6, 1], ar[7, 4], ar[8, 3]]
```

```
6 Diag[ar[4, 3], ar[6, 1], ar[7, 5], ar[8, 2]]
7 Diag[ar[4, 7], ar[5, 3], ar[6, 1], ar[8, 2]]
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
9 Diag[ar[4, 5], ar[6, 1], ar[7, 3], ar[8, 2]]
10 Diag[ar[5, 4], ar[6, 1], ar[7, 3], ar[8, 2]]
11 Diag[ar[1, 7], ar[4, 2], ar[6, 3], ar[8, 5]]
12 Diag[ar[1, 7], ar[3, 6], ar[4, 8], ar[5, 2]]
13 Diag[ar[1, 7], ar[3, 6], ar[5, 2], ar[8, 4]]
14 Diag[ar[1, 7], ar[5, 2], ar[6, 3], ar[8, 4]]
15 Diag[ar[1, 7], ar[3, 8], ar[5, 2], ar[6, 4]]
16 Diag[ar[1, 7], ar[5, 2], ar[6, 4], ar[8, 3]]
17 Diag[ar[1, 7], ar[2, 6], ar[5, 3], ar[8, 4]]
18 Diag[ar[1, 7], ar[4, 3], ar[6, 2], ar[8, 5]]
19 Diag[ar[1, 7], ar[3, 5], ar[4, 8], ar[6, 2]]
20 Diag[ar[1, 7], ar[3, 5], ar[6, 2], ar[8, 4]]
21 Diag[ar[1, 7], ar[4, 8], ar[5, 3], ar[6, 2]]
22 Diag[ar[1, 7], ar[5, 3], ar[6, 2], ar[8, 4]]
23 Diag[ar[1, 7], ar[3, 8], ar[4, 5], ar[6, 2]]
24 Diag[ar[1, 7], ar[3, 8], ar[5, 4], ar[6, 2]]
25 Diag[ar[1, 7], ar[4, 5], ar[6, 2], ar[8, 3]]
26 Diag[ar[1, 7], ar[5, 4], ar[6, 2], ar[8, 3]]
27 Diag[ar[1, 7], ar[2, 8], ar[5, 3], ar[6, 4]]
28 Diag[ar[1, 7], ar[2, 8], ar[5, 4], ar[6, 3]]
29 Diag[ar[1, 7], ar[3, 5], ar[6, 4], ar[8, 2]]
30 Diag[ar[1, 7], ar[4, 6], ar[5, 3], ar[8, 2]]
31 Diag[ar[1, 7], ar[5, 3], ar[6, 4], ar[8, 2]]
32 Diag[ar[1, 7], ar[5, 4], ar[6, 3], ar[8, 2]]
33 Diag[ar[3, 2], ar[4, 8], ar[6, 5], ar[7, 1]]
34 Diag[ar[3, 2], ar[6, 5], ar[7, 1], ar[8, 4]]
35 Diag[ar[4, 2], ar[5, 3], ar[6, 8], ar[7, 1]]
36 Diag[ar[4, 2], ar[5, 3], ar[7, 1], ar[8, 6]]
37 Diag[ar[4, 2], ar[5, 8], ar[6, 3], ar[7, 1]]
38 Diag[ar[4, 2], ar[6, 3], ar[7, 1], ar[8, 5]]
39 Diag[ar[2, 5], ar[4, 8], ar[6, 3], ar[7, 1]]
40 Diag[ar[2, 5], ar[6, 3], ar[7, 1], ar[8, 4]]
```

```
41 Diag[ar[3, 4], ar[5, 2], ar[6, 8], ar[7, 1]]
42 Diag[ar[3, 4], ar[5, 2], ar[7, 1], ar[8, 6]]
43 Diag[ar[4, 3], ar[5, 2], ar[6, 8], ar[7, 1]]
44 Diag[ar[4, 3], ar[5, 2], ar[7, 1], ar[8, 6]]
45 Diag[ar[3, 6], ar[4, 8], ar[5, 2], ar[7, 1]]
46 Diag[ar[3, 6], ar[5, 2], ar[7, 1], ar[8, 4]]
47 Diag[ar[4, 8], ar[5, 2], ar[6, 3], ar[7, 1]]
48 Diag[ar[5, 2], ar[6, 3], ar[7, 1], ar[8, 4]]
49 Diag[ar[3, 8], ar[4, 6], ar[5, 2], ar[7, 1]]
50 Diag[ar[3, 8], ar[5, 2], ar[6, 4], ar[7, 1]]
51 Diag[ar[4, 6], ar[5, 2], ar[7, 1], ar[8, 3]]
52 Diag[ar[5, 2], ar[6, 4], ar[7, 1], ar[8, 3]]
53 Diag[ar[2, 6], ar[4, 3], ar[5, 8], ar[7, 1]]
54 Diag[ar[2, 6], ar[4, 3], ar[7, 1], ar[8, 5]]
55 Diag[ar[2, 6], ar[3, 5], ar[4, 8], ar[7, 1]]
56 Diag[ar[2, 6], ar[3, 5], ar[7, 1], ar[8, 4]]
57 Diag[ar[2, 6], ar[4, 8], ar[5, 3], ar[7, 1]]
58 Diag[ar[2, 6], ar[5, 3], ar[7, 1], ar[8, 4]]
59 Diag[ar[2, 6], ar[3, 8], ar[5, 4], ar[7, 1]]
60 Diag[ar[2, 6], ar[4, 5], ar[7, 1], ar[8, 3]]
61 Diag[ar[2, 6], ar[5, 4], ar[7, 1], ar[8, 3]]
62 Diag[ar[4, 3], ar[5, 8], ar[6, 2], ar[7, 1]]
63 Diag[ar[4, 3], ar[6, 2], ar[7, 1], ar[8, 5]]
64 Diag[ar[3, 5], ar[4, 8], ar[6, 2], ar[7, 1]]
65 Diag[ar[3, 5], ar[6, 2], ar[7, 1], ar[8, 4]]
66 Diag[ar[4, 8], ar[5, 3], ar[6, 2], ar[7, 1]]
67 Diag[ar[5, 3], ar[6, 2], ar[7, 1], ar[8, 4]]
68 Diag[ar[3, 8], ar[4, 5], ar[6, 2], ar[7, 1]]
69 Diag[ar[3, 8], ar[5, 4], ar[6, 2], ar[7, 1]]
70 Diag[ar[4, 5], ar[6, 2], ar[7, 1], ar[8, 3]]
71 Diag[ar[5, 4], ar[6, 2], ar[7, 1], ar[8, 3]]
72 Diag[ar[2, 8], ar[3, 5], ar[6, 4], ar[7, 1]]
73 Diag[ar[2, 8], ar[4, 6], ar[5, 3], ar[7, 1]]
74 Diag[ar[2, 8], ar[5, 3], ar[6, 4], ar[7, 1]]
75 Diag[ar[2, 8], ar[3, 6], ar[4, 5], ar[7, 1]]
```

```
76 Diag[ar[2, 8], ar[3, 6], ar[5, 4], ar[7, 1]]
77 Diag[ar[2, 8], ar[4, 5], ar[6, 3], ar[7, 1]]
78 Diag[ar[2, 8], ar[5, 4], ar[6, 3], ar[7, 1]]
79 Diag[ar[3, 5], ar[6, 4], ar[7, 1], ar[8, 2]]
80 Diag[ar[4, 6], ar[5, 3], ar[7, 1], ar[8, 2]]
81 Diag[ar[5, 3], ar[6, 4], ar[7, 1], ar[8, 2]]
82 Diag[ar[3, 6], ar[4, 5], ar[7, 1], ar[8, 2]]
83 Diag[ar[3, 6], ar[5, 4], ar[7, 1], ar[8, 2]]
84 Diag[ar[4, 5], ar[6, 3], ar[7, 1], ar[8, 2]]
85 Diag[ar[5, 4], ar[6, 3], ar[7, 1], ar[8, 2]]
86 Diag[ar[1, 8], ar[5, 2], ar[6, 4], ar[7, 3]]
87 Diag[ar[1, 8], ar[2, 6], ar[4, 7], ar[5, 3]]
88 Diag[ar[1, 8], ar[2, 6], ar[5, 3], ar[7, 4]]
89 Diag[ar[1, 8], ar[4, 3], ar[5, 7], ar[6, 2]]
90 Diag[ar[1, 8], ar[4, 3], ar[6, 2], ar[7, 5]]
91 Diag[ar[1, 8], ar[3, 5], ar[4, 7], ar[6, 2]]
92 Diag[ar[1, 8], ar[3, 5], ar[6, 2], ar[7, 4]]
93 Diag[ar[1, 8], ar[4, 7], ar[5, 3], ar[6, 2]]
94 Diag[ar[1, 8], ar[5, 3], ar[6, 2], ar[7, 4]]
95 Diag[ar[1, 8], ar[3, 7], ar[4, 5], ar[6, 2]]
96 Diag[ar[1, 8], ar[3, 7], ar[5, 4], ar[6, 2]]
97 Diag[ar[1, 8], ar[4, 5], ar[6, 2], ar[7, 3]]
98 Diag[ar[1, 8], ar[5, 4], ar[6, 2], ar[7, 3]]
99 Diag[ar[1, 8], ar[2, 7], ar[3, 5], ar[6, 4]]
100 Diag[ar[1, 8], ar[2, 7], ar[4, 6], ar[5, 3]]
101 Diag[ar[1, 8], ar[2, 7], ar[5, 3], ar[6, 4]]
102 Diag[ar[1, 8], ar[2, 7], ar[3, 6], ar[4, 5]]
103 Diag[ar[1, 8], ar[2, 7], ar[3, 6], ar[5, 4]]
104 Diag[ar[1, 8], ar[2, 7], ar[4, 5], ar[6, 3]]
105 Diag[ar[1, 8], ar[2, 7], ar[5, 4], ar[6, 3]]
106 Diag[ar[1, 8], ar[3, 5], ar[6, 4], ar[7, 2]]
107 Diag[ar[1, 8], ar[4, 6], ar[5, 3], ar[7, 2]]
108 Diag[ar[1, 8], ar[5, 3], ar[6, 4], ar[7, 2]]
109 Diag[ar[1, 8], ar[3, 6], ar[4, 5], ar[7, 2]]
110 Diag[ar[1, 8], ar[3, 6], ar[5, 4], ar[7, 2]]
```

```
111 Diag[ar[1, 8], ar[4, 5], ar[6, 3], ar[7, 2]]
112 Diag[ar[1, 8], ar[5, 4], ar[6, 3], ar[7, 2]]
113 Diag[ar[5, 2], ar[6, 4], ar[7, 3], ar[8, 1]]
114 Diag[ar[2, 6], ar[4, 7], ar[5, 3], ar[8, 1]]
115 Diag[ar[2, 6], ar[5, 3], ar[7, 4], ar[8, 1]]
116 Diag[ar[4, 3], ar[5, 7], ar[6, 2], ar[8, 1]]
117 Diag[ar[4, 3], ar[6, 2], ar[7, 5], ar[8, 1]]
118 Diag[ar[3, 5], ar[4, 7], ar[6, 2], ar[8, 1]]
119 Diag[ar[3, 5], ar[6, 2], ar[7, 4], ar[8, 1]]
120 Diag[ar[4, 7], ar[5, 3], ar[6, 2], ar[8, 1]]
121 Diag[ar[5, 3], ar[6, 2], ar[7, 4], ar[8, 1]]
122 Diag[ar[3, 7], ar[4, 5], ar[6, 2], ar[8, 1]]
123 Diag[ar[3, 7], ar[5, 4], ar[6, 2], ar[8, 1]]
124 Diag[ar[4, 5], ar[6, 2], ar[7, 3], ar[8, 1]]
125 Diag[ar[5, 4], ar[6, 2], ar[7, 3], ar[8, 1]]
126 Diag[ar[2, 7], ar[3, 5], ar[6, 4], ar[8, 1]]
127 Diag[ar[2, 7], ar[4, 6], ar[5, 3], ar[8, 1]]
128 Diag[ar[2, 7], ar[5, 3], ar[6, 4], ar[8, 1]]
129 Diag[ar[2, 7], ar[3, 6], ar[4, 5], ar[8, 1]]
130 Diag[ar[2, 7], ar[3, 6], ar[5, 4], ar[8, 1]]
131 Diag[ar[2, 7], ar[4, 5], ar[6, 3], ar[8, 1]]
132 Diag[ar[2, 7], ar[5, 4], ar[6, 3], ar[8, 1]]
133 Diag[ar[3, 5], ar[6, 4], ar[7, 2], ar[8, 1]]
134 Diag[ar[4, 6], ar[5, 3], ar[7, 2], ar[8, 1]]
135 Diag[ar[5, 3], ar[6, 4], ar[7, 2], ar[8, 1]]
136 Diag[ar[3, 6], ar[4, 5], ar[7, 2], ar[8, 1]]
137 Diag[ar[3, 6], ar[5, 4], ar[7, 2], ar[8, 1]]
138 Diag[ar[4, 5], ar[6, 3], ar[7, 2], ar[8, 1]]
139 Diag[ar[5, 4], ar[6, 3], ar[7, 2], ar[8, 1]]
```

Finding EWs...

Computing mat...

```
{139, 69 114}
```

Computing Rank...



```
diag = BasisAArrow[4][[101]]
Diag[ar[1, 8], ar[2, 7], ar[5, 3], ar[6, 4]]

Timing[UGLnBiAlg[diag]]
Timing[USO[diag]]
```

A very large output was generated. Here is a sample of it:

$$\left\{ 229.157, \frac{1}{16} n h[1]^2 RW[] + \frac{3}{4} n^2 h[1]^2 RW[101] + \frac{1}{2} n^3 h[1]^2 RW[101] + \frac{3}{4} n^2 h[2]^2 RW[101] + \frac{5}{4} n^3 h[2]^2 RW[101] + \ll 61\ 015 \gg + 24 n^8 RW[108, 206, 307, 405, 504, 602, 703, 801] + 24 n^8 RW[108, 207, 304, 403, 506, 605, 702, 801] + 24 n^8 RW[108, 207, 305, 406, 503, 604, 702, 801] + 24 n^8 RW[108, 207, 306, 405, 504, 603, 702, 801] \right\}$$
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A very large output was generated. Here is a sample of it:

$$\left\{ 3207.21, \frac{1}{16} n h[1]^2 RSW[] + \frac{3}{2} n^2 h[1]^2 RSW[111] + 2 n^3 h[1]^2 RSW[111] + \frac{3}{2} n^2 h[2]^2 RSW[111] + \ll 240\ 520 \gg + 24 n^8 RSW[218, 226, 237, 245, 318, 326, 337, 345] + 24 n^8 RSW[218, 227, 234, 256, 318, 327, 334, 356] + 24 n^8 RSW[218, 227, 235, 246, 318, 327, 335, 346] + 24 n^8 RSW[218, 227, 236, 245, 318, 327, 336, 345] \right\}$$
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```
diag2 = BasisAArrow[4][[1]]
Timing[UGLnBiAlg[diag2]]
Timing[USO[diag2]]
Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]]
```

A very large output was generated. Here is a sample of it:

$$\left\{ 1071.04, \frac{1}{16} n h[1]^2 RW[] + 56 n^2 RW[101] + \frac{373}{2} n^3 RW[101] + 207 n^4 RW[101] + \ll 69\,759 \gg + 24 n^8 RW[108, 206, 307, 405, 504, 602, 703, 801] + 24 n^8 RW[108, 207, 304, 403, 506, 605, 702, 801] + 24 n^8 RW[108, 207, 305, 406, 503, 604, 702, 801] + 24 n^8 RW[108, 207, 306, 405, 504, 603, 702, 801] \right\}$$
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A very large output was generated. Here is a sample of it:

$$\left\{ 18\,300.2, \frac{1}{16} n h[1]^2 RSW[] + 112 n^2 RSW[111] + 1118 n^3 RSW[111] + 2220 n^4 RSW[111] + \ll 249\,731 \gg + 24 n^8 RSW[218, 226, 237, 245, 318, 326, 337, 345] + 24 n^8 RSW[218, 227, 234, 256, 318, 327, 334, 356] + 24 n^8 RSW[218, 227, 235, 246, 318, 327, 335, 346] + 24 n^8 RSW[218, 227, 236, 245, 318, 327, 336, 345] \right\}$$
[Show Less](#)
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```
diag3 = Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[7, 8]]
Timing[UGLnBiAlg[diag3]]
Timing[USO[diag3]]
Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[7, 8]]
```

A very large output was generated. Here is a sample of it:

$$\left\{ 76.1494, \frac{1}{16} n h[1]^2 RW[] - \frac{1}{4} n h[1]^2 RW[101, 101] - \frac{1}{4} n^2 h[2]^2 RW[101, 101] + \right. \\ \left. \ll 12980 \gg + 24 n^8 RW[108, 206, 307, 405, 504, 602, 703, 801] + \right. \\ \left. 24 n^8 RW[108, 207, 304, 403, 506, 605, 702, 801] + \right. \\ \left. 24 n^8 RW[108, 207, 305, 406, 503, 604, 702, 801] + \right. \\ \left. 24 n^8 RW[108, 207, 306, 405, 504, 603, 702, 801] \right\}$$
[Show Less](#)
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A very large output was generated. Here is a sample of it:

$$\left\{ 1090.63, \frac{1}{16} n h[1]^2 RSW[] - \frac{1}{4} n h[1]^2 RSW[111, 111] - \frac{1}{4} n^2 h[2]^2 RSW[111, 111] + \right. \\ \left. \ll 120263 \gg + 24 n^8 RSW[218, 226, 237, 245, 318, 326, 337, 345] + \right. \\ \left. 24 n^8 RSW[218, 227, 234, 256, 318, 327, 334, 356] + \right. \\ \left. 24 n^8 RSW[218, 227, 235, 246, 318, 327, 335, 346] + \right. \\ \left. 24 n^8 RSW[218, 227, 236, 245, 318, 327, 336, 345] \right\}$$
[Show Less](#)
[Show More](#)
[Show Full Output](#)
[Set Size Limit...](#)

```
diag1 : diag3
```

```
61 015. / 12 980
```

```
4.70069
```

```
240 520. / 120 263
```

```
1.99995
```

```
diag2 : diag3
```

```
69 759. / 12 980
```

```
5.37435
```

```
249 731. / 120 263
```

```
2.07654
```

```
diag4 = Diag[ar[8, 1], ar[7, 2], ar[6, 3], ar[5, 4]]
Timing[UGLnBiAlg[diag4]]
Timing[USO[diag4]]
Diag[ar[5, 4], ar[6, 3], ar[7, 2], ar[8, 1]]
```

A very large output was generated. Here is a sample of it:

```
{926.136,  $\frac{1}{16} n h[1]^2 RW[] + 17 n^2 RW[101] + 66 n^3 RW[101] + 82 n^4 RW[101] +$ 
  33 n5 RW[101] + <<66 827>> + 24 n8 RW[108, 206, 305, 407, 503, 602, 704, 801] +
  24 n8 RW[108, 206, 307, 405, 504, 602, 703, 801] +
  24 n8 RW[108, 207, 304, 403, 506, 605, 702, 801] +
  24 n8 RW[108, 207, 305, 406, 503, 604, 702, 801] +
  24 n8 RW[108, 207, 306, 405, 504, 603, 702, 801]}
```

[Show Less](#)
[Show More](#)
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[Set Size Limit...](#)

A very large output was generated. Here is a sample of it:

```
{16 405.2,  $\frac{1}{16} n h[1]^2 RSW[] + 34 n^2 RSW[111] + 394 n^3 RSW[111] +$ 
  880 n4 RSW[111] + <<240 948>> + 24 n8 RSW[218, 226, 237, 245, 318, 326, 337, 345] +
  24 n8 RSW[218, 227, 234, 256, 318, 327, 334, 356] +
  24 n8 RSW[218, 227, 235, 246, 318, 327, 335, 346] +
  24 n8 RSW[218, 227, 236, 245, 318, 327, 336, 345]}
```

[Show Less](#)
[Show More](#)
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[Set Size Limit...](#)

16 405. / 60

273.417

18 300. / 60

305.

? b

Global`b

Diagrams [4 ar]

A very large output was generated. Here is a sample of it:

```
{Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[7, 8]],
  Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[8, 7]], Diag[ar[1, 2], ar[3, 4], ar[6, 5], ar[7, 8]],
  Diag[ar[1, 2], ar[3, 4], ar[6, 5], ar[8, 7]], <<1672>>,
  Diag[ar[3, 6], ar[4, 5], ar[7, 2], ar[8, 1]], Diag[ar[3, 6], ar[5, 4], ar[7, 2], ar[8, 1]],
  Diag[ar[4, 5], ar[6, 3], ar[7, 2], ar[8, 1]], Diag[ar[5, 4], ar[6, 3], ar[7, 2], ar[8, 1]]}
```

[Show Less](#)
[Show More](#)
[Show Full Output](#)
[Set Size Limit...](#)

Diagrams [4 ar]

A very large output was generated. Here is a sample of it:

```
{Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[7, 8]],
  Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[8, 7]], Diag[ar[1, 2], ar[3, 4], ar[6, 5], ar[7, 8]],
  Diag[ar[1, 2], ar[3, 4], ar[6, 5], ar[8, 7]], <<1672>>,
  Diag[ar[3, 6], ar[4, 5], ar[7, 2], ar[8, 1]], Diag[ar[3, 6], ar[5, 4], ar[7, 2], ar[8, 1]],
  Diag[ar[4, 5], ar[6, 3], ar[7, 2], ar[8, 1]], Diag[ar[5, 4], ar[6, 3], ar[7, 2], ar[8, 1]]}
```

Show Less

Show More

Show Full Output

Set Size Limit...

```
arbit = {Diagrams [4 ar] [[1]]};
```

```
For[i = 1, i < 17, i++,
```

```
  arbit = Append[arbit, Diagrams [4 ar] [[i * 100]]];
```

```
arbit
```

```
{Diag[ar[1, 2], ar[3, 4], ar[5, 6], ar[7, 8]],
  Diag[ar[1, 2], ar[3, 8], ar[5, 4], ar[7, 6]], Diag[ar[2, 1], ar[3, 7], ar[6, 4], ar[8, 5]],
  Diag[ar[1, 3], ar[2, 6], ar[7, 5], ar[8, 4]], Diag[ar[3, 1], ar[5, 2], ar[6, 4], ar[8, 7]],
  Diag[ar[1, 4], ar[3, 2], ar[7, 5], ar[8, 6]], Diag[ar[1, 4], ar[6, 5], ar[7, 3], ar[8, 2]],
  Diag[ar[2, 8], ar[4, 1], ar[5, 3], ar[7, 6]], Diag[ar[1, 5], ar[2, 7], ar[6, 3], ar[8, 4]],
  Diag[ar[2, 6], ar[5, 1], ar[7, 4], ar[8, 3]], Diag[ar[1, 6], ar[4, 2], ar[5, 3], ar[8, 7]],
  Diag[ar[3, 2], ar[6, 1], ar[7, 4], ar[8, 5]], Diag[ar[5, 4], ar[6, 1], ar[7, 3], ar[8, 2]],
  Diag[ar[1, 7], ar[2, 8], ar[4, 3], ar[6, 5]], Diag[ar[2, 6], ar[5, 3], ar[7, 1], ar[8, 4]],
  Diag[ar[1, 8], ar[2, 5], ar[6, 4], ar[7, 3]], Diag[ar[4, 2], ar[5, 3], ar[7, 6], ar[8, 1]]}
```

```
ds = Join[Take[BasisAArrow[4], All], arbit];
```

```
Length[ds]
```

```
156
```

```
ds = Join[Take[BasisAArrow[4], All], arbit];
```

```
vs = Table[
```

```
  Print[i, " ", ds[[i]]];
```

```
  SOU[4, ds[[i]]],
```

```
  {i, Length[ds]}
];
```

```
Print["Finding EWs..."];
```

```
EWs = Union[Cases[vs, _EW, Infinity]];
```

```
EWRule = Dispatch[Thread[EWs → Array[v, {Length[EWs]}]]];
```

```
Print["Computing mat..."];
```

```
Print[{Length[vs], Length[EWs]}];
```

```
mat = SparseArray[
```

```
  Join @@ Table[
```

```
    t = List @@ (vs[[i]] /. EWRule);
```

```
    Replace[#, c_. * v[j_] => ({i, j} → c)] & /@ t,
```

```
    {i, Length[vs]}
  ],
```

```
{Length[vs], Length[EWs]}
];
```

```
Print["Computing Rank..."];
```

```
MatrixRank[mat]
```

```

1 Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]]
Computing OrderTypes[8, {{1, 2}, {3, 4}, {5, 6}, {7, 8}}]
Computing OrderTypes[8, {{3, 4}, {5, 6}, {7, 8}}]
Computing OrderTypes[8, {{5, 6}, {7, 8}}]
Computing OrderTypes[8, {{7, 8}}]
Computing OrderTypes[7, {{1, 2}, {3, 4}, {5, 6}}]
Computing OrderTypes[7, {{3, 4}, {5, 6}}]
Computing OrderTypes[7, {{5, 6}}]
Computing OrderTypes[5, {{1, 2}, {3, 4}}]
Computing OrderTypes[5, {{3, 4}}]
Computing OrderTypes[3, {{1, 2}}]
Computing OrderTypes[6, {{1, 2}, {3, 4}}]
Computing OrderTypes[6, {{3, 4}}]
Computing OrderTypes[4, {{1, 2}}]
Computing OrderTypes[5, {{1, 2}}]
Computing OrderTypes[7, {{1, 2}, {3, 4}, {6, 7}}]
Computing OrderTypes[7, {{3, 4}, {6, 7}}]
Computing OrderTypes[7, {{6, 7}}]
Computing OrderTypes[5, {{1, 2}, {4, 5}}]
Computing OrderTypes[5, {{4, 5}}]
Computing OrderTypes[3, {{2, 3}}]
Computing OrderTypes[6, {{1, 2}, {5, 6}}]
Computing OrderTypes[6, {{5, 6}}]
Computing OrderTypes[4, {{3, 4}}]
Computing OrderTypes[7, {{1, 2}, {4, 5}, {6, 7}}]
Computing OrderTypes[7, {{4, 5}, {6, 7}}]
Computing OrderTypes[5, {{2, 3}, {4, 5}}]
Computing OrderTypes[6, {{3, 4}, {5, 6}}]
Computing OrderTypes[7, {{2, 3}, {4, 5}, {6, 7}}]
{1 390 450, 166 564}
2 Diag[ar[3, 2], ar[6, 1], ar[7, 5], ar[8, 4]]
{1 390 450, 164 705}
3 Diag[ar[4, 2], ar[6, 1], ar[7, 5], ar[8, 3]]
{1 390 450, 165 573}
4 Diag[ar[4, 7], ar[5, 2], ar[6, 1], ar[8, 3]]

```

```
{1390450, 168047}
5 Diag[ar[5, 2], ar[6, 1], ar[7, 4], ar[8, 3]]
{1390450, 166273}
6 Diag[ar[4, 3], ar[6, 1], ar[7, 5], ar[8, 2]]
{1390450, 166990}
7 Diag[ar[4, 7], ar[5, 3], ar[6, 1], ar[8, 2]]
{1390450, 167920}
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
{1390450, 165573}
9 Diag[ar[4, 5], ar[6, 1], ar[7, 3], ar[8, 2]]
{1390450, 166207}
10 Diag[ar[5, 4], ar[6, 1], ar[7, 3], ar[8, 2]]
{1390450, 166463}
11 Diag[ar[1, 7], ar[4, 2], ar[6, 3], ar[8, 5]]
{1390450, 170286}
12 Diag[ar[1, 7], ar[3, 6], ar[4, 8], ar[5, 2]]
{1390450, 151009}
13 Diag[ar[1, 7], ar[3, 6], ar[5, 2], ar[8, 4]]
{1390450, 168509}
14 Diag[ar[1, 7], ar[5, 2], ar[6, 3], ar[8, 4]]
{1390450, 170591}
15 Diag[ar[1, 7], ar[3, 8], ar[5, 2], ar[6, 4]]
{1390450, 168503}
16 Diag[ar[1, 7], ar[5, 2], ar[6, 4], ar[8, 3]]
{1390450, 168626}
17 Diag[ar[1, 7], ar[2, 6], ar[5, 3], ar[8, 4]]
{1390450, 167624}
18 Diag[ar[1, 7], ar[4, 3], ar[6, 2], ar[8, 5]]
{1390450, 170639}
19 Diag[ar[1, 7], ar[3, 5], ar[4, 8], ar[6, 2]]
{1390450, 153117}
20 Diag[ar[1, 7], ar[3, 5], ar[6, 2], ar[8, 4]]
{1390450, 168276}
21 Diag[ar[1, 7], ar[4, 8], ar[5, 3], ar[6, 2]]
{1390450, 167813}
```

```
22 Diag[ar[1, 7], ar[5, 3], ar[6, 2], ar[8, 4]]
{1390450, 170394}
23 Diag[ar[1, 7], ar[3, 8], ar[4, 5], ar[6, 2]]
{1390450, 152082}
24 Diag[ar[1, 7], ar[3, 8], ar[5, 4], ar[6, 2]]
{1390450, 168422}
25 Diag[ar[1, 7], ar[4, 5], ar[6, 2], ar[8, 3]]
{1390450, 168845}
26 Diag[ar[1, 7], ar[5, 4], ar[6, 2], ar[8, 3]]
{1390450, 170546}
27 Diag[ar[1, 7], ar[2, 8], ar[5, 3], ar[6, 4]]
{1390450, 161041}
28 Diag[ar[1, 7], ar[2, 8], ar[5, 4], ar[6, 3]]
{1390450, 161125}
29 Diag[ar[1, 7], ar[3, 5], ar[6, 4], ar[8, 2]]
{1390450, 165287}
30 Diag[ar[1, 7], ar[4, 6], ar[5, 3], ar[8, 2]]
{1390450, 162009}
31 Diag[ar[1, 7], ar[5, 3], ar[6, 4], ar[8, 2]]
{1390450, 167675}
32 Diag[ar[1, 7], ar[5, 4], ar[6, 3], ar[8, 2]]
{1390450, 167717}
33 Diag[ar[3, 2], ar[4, 8], ar[6, 5], ar[7, 1]]
{1390450, 167910}
34 Diag[ar[3, 2], ar[6, 5], ar[7, 1], ar[8, 4]]
{1390450, 164101}
35 Diag[ar[4, 2], ar[5, 3], ar[6, 8], ar[7, 1]]
{1390450, 167658}
36 Diag[ar[4, 2], ar[5, 3], ar[7, 1], ar[8, 6]]
{1390450, 161957}
37 Diag[ar[4, 2], ar[5, 8], ar[6, 3], ar[7, 1]]
{1390450, 169228}
38 Diag[ar[4, 2], ar[6, 3], ar[7, 1], ar[8, 5]]
{1390450, 162942}
39 Diag[ar[2, 5], ar[4, 8], ar[6, 3], ar[7, 1]]
```



```

{1390450, 168605}
40 Diag[ar[2, 5], ar[6, 3], ar[7, 1], ar[8, 4]]
{1390450, 169360}
41 Diag[ar[3, 4], ar[5, 2], ar[6, 8], ar[7, 1]]
{1390450, 165709}
42 Diag[ar[3, 4], ar[5, 2], ar[7, 1], ar[8, 6]]
{1390450, 163480}
43 Diag[ar[4, 3], ar[5, 2], ar[6, 8], ar[7, 1]]
{1390450, 167647}
44 Diag[ar[4, 3], ar[5, 2], ar[7, 1], ar[8, 6]]
{1390450, 164186}
45 Diag[ar[3, 6], ar[4, 8], ar[5, 2], ar[7, 1]]
{1390450, 167982}
46 Diag[ar[3, 6], ar[5, 2], ar[7, 1], ar[8, 4]]
{1390450, 166643}
47 Diag[ar[4, 8], ar[5, 2], ar[6, 3], ar[7, 1]]

SaveUSO[diag_Diag] := Module[
  {fname},
  fname = StringJoin[
    "USOFor",
    ToString[FromDigits[Cases[diag, _Integer, Infinity], sbase]],
    ".m"
  ];
  Print["Saving ", fname, " ..."];
  Put[{diag, USO[diag]}, fname];
]

For[i = 1, i ≤ Length[ds], i++,
  Print[i, " ", ds[[i]]];
  SaveUSO[ds[[i]]];
];

```

```

1 Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]]
Saving USOFFor51647382.m ...
{1390450, 166564}
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
Saving USOFFor53617482.m ...
{1390450, 165573}
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
Saving USOFFor53617482.m ...
{1390450, 165573}
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
Saving USOFFor53617482.m ...

    For[i = 1, i ≤ Length[BasisAArrow[2]], i++,
        Print[i, " ", BasisAArrow[2][[i]]];
        SaveUSO[BasisAArrow[2][[i]]]
    ];
1 Diag[ar[1, 3], ar[4, 2]]
Saving USOFFor1342.m ...
2 Diag[ar[2, 4], ar[3, 1]]
Saving USOFFor2431.m ...
3 Diag[ar[3, 1], ar[4, 2]]
Saving USOFFor3142.m ...
{178, 108}
4 Diag[ar[1, 4], ar[2, 3]]
Saving USOFFor1423.m ...
5 Diag[ar[1, 4], ar[3, 2]]
Saving USOFFor1432.m ...
6 Diag[ar[2, 3], ar[4, 1]]
Saving USOFFor2341.m ...
7 Diag[ar[3, 2], ar[4, 1]]
Saving USOFFor3241.m ...

Directory[]
/home/leung

SetDirectory[ / scratch / leung]

? HomeDirectory

```

```
System`HomeDirectory
```

```
Attributes[HomeDirectory] = {Protected}
```

```
DirectoryStack []
```

```
{}
```

```
Put[liefile]
```

```
General::stream: liefile is not a string, InputStream[], or OutputStream[]. >>
```

```
SetDirectory["/scratch/leung"]
```

```
/scratch/leung
```

```
Directory []
```

```
/scratch/leung
```

```
Directory []
```

```
/scratch/leung
```

```
For[index = 1, index ≤ Length[ds], i++,
```

```
Print[i, " ", ds[[i]]];
```

```
SaveUSO[ds[[i]]]
```

```
];
```

```
1 Diag[ar[1, 3], ar[4, 2]]
```

```
Saving USOFfor1342.m ...
```

```
2 Diag[ar[2, 4], ar[3, 1]]
```

```
Saving USOFfor2431.m ...
```

```
3 Diag[ar[3, 1], ar[4, 2]]
```

```
Saving USOFfor3142.m ...
```

```
4 Diag[ar[1, 4], ar[2, 3]]
```

```
Saving USOFfor1423.m ...
```

```
5 Diag[ar[1, 4], ar[3, 2]]
```

```
Saving USOFfor1432.m ...
```

```
6 Diag[ar[2, 3], ar[4, 1]]
```

```
Saving USOFfor2341.m ...
```

```
7 Diag[ar[3, 2], ar[4, 1]]
```

```
Saving USOFfor3241.m ...
```

```
For[index = 45, index ≤ Length[ds], index++,
```

```
Print[index, " ", ds[[index]]];
```

```
Timing[SaveUSO[ds[[index]]]]
```

```
];
```

```
Length[Diagrams[4 ar]]
```

```
1680
```

```
For[index = 1, index ≤ Length[ds], index++,
  Print[index, " ", ds[[index]]];
];
```

```
1 Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]]
2 Diag[ar[3, 2], ar[6, 1], ar[7, 5], ar[8, 4]]
3 Diag[ar[4, 2], ar[6, 1], ar[7, 5], ar[8, 3]]
4 Diag[ar[4, 7], ar[5, 2], ar[6, 1], ar[8, 3]]
5 Diag[ar[5, 2], ar[6, 1], ar[7, 4], ar[8, 3]]
6 Diag[ar[4, 3], ar[6, 1], ar[7, 5], ar[8, 2]]
7 Diag[ar[4, 7], ar[5, 3], ar[6, 1], ar[8, 2]]
8 Diag[ar[5, 3], ar[6, 1], ar[7, 4], ar[8, 2]]
9 Diag[ar[4, 5], ar[6, 1], ar[7, 3], ar[8, 2]]
10 Diag[ar[5, 4], ar[6, 1], ar[7, 3], ar[8, 2]]
11 Diag[ar[1, 7], ar[4, 2], ar[6, 3], ar[8, 5]]
12 Diag[ar[1, 7], ar[3, 6], ar[4, 8], ar[5, 2]]
13 Diag[ar[1, 7], ar[3, 6], ar[5, 2], ar[8, 4]]
14 Diag[ar[1, 7], ar[5, 2], ar[6, 3], ar[8, 4]]
15 Diag[ar[1, 7], ar[3, 8], ar[5, 2], ar[6, 4]]
16 Diag[ar[1, 7], ar[5, 2], ar[6, 4], ar[8, 3]]
17 Diag[ar[1, 7], ar[2, 6], ar[5, 3], ar[8, 4]]
18 Diag[ar[1, 7], ar[4, 3], ar[6, 2], ar[8, 5]]
19 Diag[ar[1, 7], ar[3, 5], ar[4, 8], ar[6, 2]]
20 Diag[ar[1, 7], ar[3, 5], ar[6, 2], ar[8, 4]]
21 Diag[ar[1, 7], ar[4, 8], ar[5, 3], ar[6, 2]]
22 Diag[ar[1, 7], ar[5, 3], ar[6, 2], ar[8, 4]]
23 Diag[ar[1, 7], ar[3, 8], ar[4, 5], ar[6, 2]]
24 Diag[ar[1, 7], ar[3, 8], ar[5, 4], ar[6, 2]]
25 Diag[ar[1, 7], ar[4, 5], ar[6, 2], ar[8, 3]]
26 Diag[ar[1, 7], ar[5, 4], ar[6, 2], ar[8, 3]]
27 Diag[ar[1, 7], ar[2, 8], ar[5, 3], ar[6, 4]]
28 Diag[ar[1, 7], ar[2, 8], ar[5, 4], ar[6, 3]]
29 Diag[ar[1, 7], ar[3, 5], ar[6, 4], ar[8, 2]]
30 Diag[ar[1, 7], ar[4, 6], ar[5, 3], ar[8, 2]]
```

```
31 Diag[ar[1, 7], ar[5, 3], ar[6, 4], ar[8, 2]]
32 Diag[ar[1, 7], ar[5, 4], ar[6, 3], ar[8, 2]]
33 Diag[ar[3, 2], ar[4, 8], ar[6, 5], ar[7, 1]]
34 Diag[ar[3, 2], ar[6, 5], ar[7, 1], ar[8, 4]]
35 Diag[ar[4, 2], ar[5, 3], ar[6, 8], ar[7, 1]]
36 Diag[ar[4, 2], ar[5, 3], ar[7, 1], ar[8, 6]]
37 Diag[ar[4, 2], ar[5, 8], ar[6, 3], ar[7, 1]]
38 Diag[ar[4, 2], ar[6, 3], ar[7, 1], ar[8, 5]]
39 Diag[ar[2, 5], ar[4, 8], ar[6, 3], ar[7, 1]]
40 Diag[ar[2, 5], ar[6, 3], ar[7, 1], ar[8, 4]]
41 Diag[ar[3, 4], ar[5, 2], ar[6, 8], ar[7, 1]]
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44 Diag[ar[4, 3], ar[5, 2], ar[7, 1], ar[8, 6]]
45 Diag[ar[3, 6], ar[4, 8], ar[5, 2], ar[7, 1]]
46 Diag[ar[3, 6], ar[5, 2], ar[7, 1], ar[8, 4]]
47 Diag[ar[4, 8], ar[5, 2], ar[6, 3], ar[7, 1]]
48 Diag[ar[5, 2], ar[6, 3], ar[7, 1], ar[8, 4]]
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50 Diag[ar[3, 8], ar[5, 2], ar[6, 4], ar[7, 1]]
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56 Diag[ar[2, 6], ar[3, 5], ar[7, 1], ar[8, 4]]
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156 Diag[ar[4, 2], ar[5, 3], ar[7, 6], ar[8, 1]]
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