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In[1]:= SetDirectory["C:/drorbn/AcademicPensieve/Projects/Arrow_Diagrams_and_gl(N)"];
<< "Arrow_Diagrams_and_gl(N).m"
base = 10;
arbit = {Diagrams[4 ar][[1]]};
For[i = 1, i < 17, i++,
  arbit = Append[arbit, Diagrams[4 ar][[i * 100]]];
ds = Join[Take[BasisAArrow[4], All], arbit];
Load[diag_, type_String] := Module[
  {fstring},
  fstring = ToString[FromDigits[Cases[diag, _Integer, Infinity], base]];
  Print["Loading ", fstring, " ", type, " information ..."];
  Last@Get["data/U" <> type <> "For" <> fstring <> ".m"]
];
U[deg_, diag_] := Expand[16 Plus[
  Load[diag, "GL"] /. n^p_.*RW[l___] => EW[GL*n^p*FromDigits[{1}, base^2]] //.
  h[i_]^p_.*EW[l_] => EW[h[i]^p l],
  Load[diag, "SO"] /. n^p_.*RSW[l___] => EW[SO*n^p*FromDigits[{1}, sbase^3]] //.
  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]
]];

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In[9]:= diags = Take[ds, All];
mat = {};
EWRules = {};
Do[
  Print[{i, diags[[i]], MaxMemoryUsed[], TimeUsed[]}];
  vect = U[4, diags[[i]] /. EWRules;
  Print["Length[vect] is ", Length[vect]];
  EWS = Union[Cases[vect, _EW, Infinity]];
  If[EWRules === {}, l = 0, l = Length[EWRules[[1]]]];
  Print["l is ", l];
  If[EWRules === {},
    EWRules = Dispatch[Thread[
      EWS → Table[v[j+1], {j, Length[EWS]}]
    ]],
    EWRules = Dispatch[Join[EWRules[[1]], Thread[
      EWS → Table[v[j+1], {j, Length[EWS]}]
    ]]];
];
l = Length[EWRules[[1]]];
Print["l is ", l];
Print[i];
AppendTo[mat,
  Replace[#, c_. * v[j_] ⇒ ({i, j} → c)] & /@ (List @@ vect /. EWRules)
],
{i, Length[diags]}
];
mat = SparseArray[Flatten[mat], {Length[diags], l}];
Print["Computing Rank..."];
MatrixRank[mat]

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```
{1, Diag[ar[5, 1], ar[6, 4], ar[7, 3], ar[8, 2]], 10 368 440, 0.405}
Loading 51647382 GL information ...
Loading 51647382 SO information ...
Computing OrderTypes[2, {{1, 2}}]
Computing OrderTypes[3, {{2, 3}}]
Computing OrderTypes[4, {{3, 4}}]
Computing OrderTypes[5, {{2, 3}, {4, 5}}]
Computing OrderTypes[5, {{4, 5}}]
Computing OrderTypes[6, {{1, 2}, {3, 4}, {5, 6}}]
Computing OrderTypes[6, {{3, 4}, {5, 6}}]
Computing OrderTypes[6, {{5, 6}}]
Computing OrderTypes[4, {{1, 2}, {3, 4}}]
Length[vect] is 229 557
1 is 0
1 is 229 557
1
{2, Diag[ar[3, 2], ar[6, 1], ar[7, 5], ar[8, 4]], 184 951 520, 59.249}
Loading 32617584 GL information ...
Loading 32617584 SO information ...
Out[12]= $Aborted
Computing Rank...
Out[15]= 1
```