Pensieve header: Testing the expansion extension property for the 4-strand braid group.

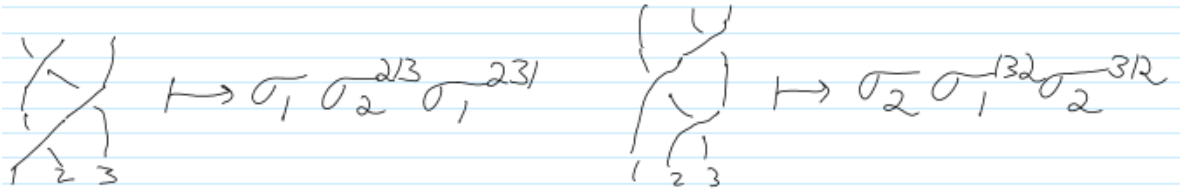
```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2015-02"];
<< ../Projects/WKO4/FreeLie.m
```

```
FreeLie` implements / extends
 {*, +, **, $SeriesShowDegree, ⟨⟩, ∫, ≡, ad, Ad, adSeries, AllCyclicWords, AllLyndonWords,
  AllWords, Arbitrator, ASeries, AW, b, BCH, BooleanSequence, BracketForm, BS, CC, Crop,
  CW, CWS, CWSeries, D, Deg, DegreeScale, DerivationSeries, div, DK, DKS, EulerE, Exp,
  Inverse, j, J, JA, LieDerivation, LieMorphism, LieSeries, LS, LW, LyndonFactorization,
  Morphism, New, RandomCWSeries, Randomizer, RandomLieSeries, RC, SeriesSolve,
  Support, t, tb, TopBracketForm, tr, UndeterminedCoefficients, Γ, ι, Λ, σ, ħ, ⟒, ⟓}.
```

```
n = 4;
Clear[s, cs];
Do[
 Do[cs[i][k, j] = 0, {j, 1, n - 1}, {k, j + 1, n}];
 cs[i][i + 1, i] = 1/2;
 s[i] = DKS[n, cs[i]],
 {i, 1, n - 1}
]
```

```
s[3]
```

$$\mathrm{DKS}\Big[\frac{\overline{t_{34}}}{2},\ \overline{t_{13}\,t_{23}}\,cs[3][3,1,2]+\overline{t_{14}\,t_{24}}\,cs[3][4,1,2]+\overline{t_{14}\,t_{34}}\,cs[3][4,1,3]+\overline{t_{24}\,t_{34}}\,cs[3][4,2,3],\ \overline{t_{13}\,\overline{t_{13}\,t_{23}}}\,cs[3][3,1,1,2]+\overline{\overline{t_{13}\,t_{23}}\,t_{23}}\,cs[3][3,1,2,2]+\overline{t_{14}\,\overline{t_{14}\,t_{24}}}\,cs[3][4,1,1,2]+\overline{t_{14}\,\overline{t_{14}\,t_{34}}}\,cs[3][4,1,1,3]+\overline{\overline{t_{14}\,t_{24}}\,t_{24}}\,cs[3][4,1,2,2]+\overline{t_{14}\,\overline{t_{24}\,t_{34}}}\,cs[3][4,1,2,3]+\overline{\overline{t_{14}\,t_{34}}\,t_{24}}\,cs[3][4,1,3,2]+\overline{\overline{t_{14}\,t_{34}}\,t_{34}}\,cs[3][4,1,3,3]+\overline{t_{24}\,\overline{t_{24}\,t_{34}}}\,cs[3][4,2,2,3]+\overline{\overline{t_{24}\,t_{34}}\,t_{34}}\,cs[3][4,2,3,3],\ \ldots\Big]$$




```
SeriesSolve[{s[1], s[2], s[3]},
 s[1] ** (s[2] // σ[2, 1, 3, 4]) ** (s[1] // σ[2, 3, 1, 4]) ≡
   s[2] ** (s[1] // σ[1, 3, 2, 4]) ** (s[2] // σ[3, 1, 2, 4])
  && s[2] ** (s[3] // σ[1, 3, 2, 4]) ** (s[2] // σ[1, 3, 4, 2]) ≡
   s[3] ** (s[2] // σ[1, 2, 4, 3]) ** (s[3] // σ[1, 4, 2, 3])
  && s[1] ** (s[3] // σ[2, 1, 3, 4]) ≡ s[3] ** (s[1] // σ[1, 2, 4, 3])
]
```

```
{s[1], s[2], s[3]}
```

```
Arbitrator called on {cs[1][3, 1, 2], cs[1][4, 1, 2], cs[1][4, 1, 3], cs[2][4, 1, 2]}...

Arbitrator called on
 {cs[1][3, 1, 1, 2], cs[1][3, 1, 2, 2], cs[1][4, 1, 1, 2], cs[1][4, 1, 1, 3], cs[1][4, 1, 2, 3],
  cs[1][4, 1, 3, 2], cs[1][4, 1, 3, 3], cs[1][4, 2, 2, 3], cs[2][3, 1, 2, 2],
  cs[2][4, 1, 1, 2], cs[2][4, 1, 2, 2], cs[2][4, 1, 2, 3], cs[3][3, 1, 1, 2]}...

{DKS[Sqrt[t12]/2, 0, 0, ...], DKS[Sqrt[t23]/2, 1/12 Sqrt[t13 t23], 0, ...],
 DKS[Sqrt[t34]/2, 1/12 Sqrt[t14 t34] + 1/12 Sqrt[t24 t34], 0, ...]}
```

s[1]@{6}

```
Arbitrator called on {cs[1][3, 1, 1, 1, 2], cs[1][3, 1, 1, 2, 2],
  cs[1][3, 1, 2, 2, 2], cs[1][4, 1, 1, 1, 2], cs[1][4, 1, 1, 1, 3], cs[1][4, 1, 1, 2, 2],
  cs[1][4, 1, 1, 2, 3], cs[1][4, 1, 1, 3, 2], cs[1][4, 1, 1, 3, 3], cs[1][4, 1, 2, 1, 3],
  cs[1][4, 1, 2, 2, 3], cs[1][4, 1, 2, 3, 3], cs[1][4, 1, 3, 2, 3], cs[1][4, 1, 3, 3, 2],
  cs[1][4, 1, 3, 3, 3], cs[1][4, 2, 2, 3, 3], cs[2][3, 1, 1, 1, 2], cs[2][4, 1, 1, 1, 2],
  cs[2][4, 1, 1, 2, 2], cs[2][4, 1, 1, 2, 3], cs[2][4, 1, 2, 1, 3], cs[2][4, 1, 2, 2, 2],
  cs[2][4, 1, 2, 3, 2], cs[3][3, 1, 1, 1, 2], cs[3][4, 1, 1, 2, 3]}...

Arbitrator called on {cs[1][3, 1, 1, 1, 1, 2], cs[1][3, 1, 1, 1, 2, 2], cs[1][3, 1, 1, 2, 1, 2],
  cs[1][3, 1, 1, 2, 2, 2], cs[1][3, 1, 2, 1, 2, 2], cs[1][3, 1, 2, 2, 2, 2],
  cs[1][4, 1, 1, 1, 1, 2], cs[1][4, 1, 1, 1, 1, 3], cs[1][4, 1, 1, 1, 2, 2],
  cs[1][4, 1, 1, 1, 2, 3], cs[1][4, 1, 1, 1, 3, 2], cs[1][4, 1, 1, 1, 3, 3],
  cs[1][4, 1, 1, 2, 1, 2], cs[1][4, 1, 1, 2, 1, 3], cs[1][4, 1, 1, 2, 2, 3],
  cs[1][4, 1, 1, 2, 3, 2], cs[1][4, 1, 1, 2, 3, 3], cs[1][4, 1, 1, 3, 1, 2],
  cs[1][4, 1, 1, 3, 1, 3], cs[1][4, 1, 1, 3, 2, 2], cs[1][4, 1, 1, 3, 2, 3],
  cs[1][4, 1, 1, 3, 3, 2], cs[1][4, 1, 1, 3, 3, 3], cs[1][4, 1, 2, 1, 2, 3],
  cs[1][4, 1, 2, 1, 3, 2], cs[1][4, 1, 2, 1, 3, 3], cs[1][4, 1, 2, 2, 1, 3],
  cs[1][4, 1, 2, 2, 2, 3], cs[1][4, 1, 2, 2, 3, 2], cs[1][4, 1, 2, 2, 3, 3],
  cs[1][4, 1, 2, 3, 1, 3], cs[1][4, 1, 2, 3, 2, 3], cs[1][4, 1, 2, 3, 3, 3],
  cs[1][4, 1, 3, 1, 3, 2], cs[1][4, 1, 3, 1, 3, 3], cs[1][4, 1, 3, 2, 3, 3],
  cs[1][4, 1, 3, 3, 2, 3], cs[1][4, 1, 3, 3, 3, 2], cs[1][4, 1, 3, 3, 3, 3],
  cs[1][4, 2, 2, 2, 2, 3], cs[1][4, 2, 2, 3, 3, 3], cs[1][4, 2, 3, 2, 3, 3],
  cs[2][3, 1, 1, 1, 2, 2], cs[2][3, 1, 1, 2, 1, 2], cs[2][4, 1, 1, 1, 1, 2],
  cs[2][4, 1, 1, 1, 2, 2], cs[2][4, 1, 1, 1, 2, 3], cs[2][4, 1, 1, 2, 1, 2],
  cs[2][4, 1, 1, 2, 1, 3], cs[2][4, 1, 1, 2, 2, 2], cs[2][4, 1, 1, 2, 2, 3],
  cs[2][4, 1, 1, 2, 3, 2], cs[2][4, 1, 1, 2, 3, 3], cs[2][4, 1, 2, 1, 2, 2],
  cs[2][4, 1, 2, 1, 2, 3], cs[2][4, 1, 2, 1, 3, 2], cs[2][4, 1, 2, 1, 3, 3],
  cs[2][4, 1, 2, 2, 2, 2], cs[2][4, 1, 2, 2, 2, 3], cs[2][4, 1, 2, 3, 2, 2],
  cs[3][3, 1, 1, 1, 1, 2], cs[3][3, 1, 1, 1, 2, 2], cs[3][3, 1, 1, 2, 1, 2],
  cs[3][4, 1, 1, 1, 2, 3], cs[3][4, 1, 1, 2, 3, 3], cs[3][4, 1, 1, 3, 2, 3]}...

No solutions!

$Aborted
```