

Pensieve header: The linearized tree-level KV equations.

```
SetDirectory["C:/drorbn/AcademicPensieve/Projects/WKO4"];
<< FreeLie.m;
{A1 = LS[{x, y}, A1s], B1 = LS[{x, y}, B1s]};
msgs1 = SeriesSolve[{A1, B1},
   $\hbar^{-1} (b[LW@x, A1] + b[LW@y, B1] \equiv LS[0])$ ];
Do[A1[k];
  Print[{k, msgs1 // Read // Last // Last // Length, TimeUsed[], MaxMemoryUsed[]}],
  {k, 12}]
A1@12; Length[Last[#]] & /@ Read[msgs1]
```

FreeLie` implements / extends

```
{*, +, **, $SeriesShowDegree, <>,  $\int$ ,  $\equiv$ , 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,  $\Gamma$ ,  $\iota$ ,  $\Lambda$ ,  $\sigma$ ,  $\hbar$ ,  $\dashv$ ,  $\smile$ }.
```

FreeLie` is in the public domain. Dror Bar-Natan

is committed to support it within reason until July 15, 2022.

SeriesSolve::ArbitrarilySetting: In degree 1 arbitrarily setting {A1s[x] \rightarrow 0, A1s[y] \rightarrow 0, B1s[y] \rightarrow 0}.

```
{1, 3, 0.639, 29 597 376}
```

```
{2, 0, 0.639, 29 597 376}
```

SeriesSolve::ArbitrarilySetting: In degree 3 arbitrarily setting {A1s[x, y] \rightarrow 0}.

```
{3, 1, 0.827, 29 597 376}
```

```
{4, 0, 0.827, 29 597 376}
```

SeriesSolve::ArbitrarilySetting: In degree 5 arbitrarily setting {A1s[x, x, x, y] \rightarrow 0, A1s[x, x, y, y] \rightarrow 0, A1s[x, y, y, y] \rightarrow 0}.

General::stop: Further output of SeriesSolve::ArbitrarilySetting will be suppressed during this calculation. >>

```
{5, 3, 1.076, 29 597 376}
```

```
{6, 0, 1.092, 29 597 376}
```

```
{7, 6, 1.123, 29 597 376}
```

```
{8, 4, 1.201, 29 597 376}
```

```
{9, 13, 1.56, 33 641 192}
```

```
{10, 12, 2.106, 38 780 240}
```

```
{11, 37, 3.572, 56 209 864}
```

```
{12, 40, 8.018, 107 954 168}
```

```
{3, 0, 1, 0, 3, 0, 6, 4, 13, 12, 37, 40}
```