

Pensieve header: Fuller output of for a Drinfel'd associator Φ .

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SetDirectory["C:/drorbn/AcademicPensieve/Projects/WKO4"];
<< FreeLie.m;
 $\Phi$ s[2, 1] =  $\Phi$ s[3, 1] =  $\Phi$ s[3, 2] = 0;  $\Phi$ s[3, 1, 2] = 1/24;  $\Phi$ _0 = DKS[3,  $\Phi$ s];
SeriesSolve[ $\Phi$ _0,  $\Phi$ _0 $\sigma$ [3,2,1]  $\equiv$  - $\Phi$ _0 &&  $\Phi$ _0 **  $\Phi$ _0 $\sigma$ [1,23,4] **  $\Phi$ _0 $\sigma$ [2,3,4]  $\equiv$   $\Phi$ _0 $\sigma$ [12,3,4] **  $\Phi$ _0 $\sigma$ [1,2,34]];
 $\Phi$ _0@{6}
```

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, Γ , ι , Λ , σ , \hbar , \neg , \neg }.

FreeLie` is in the public domain; yet Dror Bar-Natan is committed to support it within reason until July 15, 2022.

Arbitrarily setting { Φ s[3, 1, 1, 2] \rightarrow 0}.
 Arbitrarily setting { Φ s[3, 1, 1, 1, 1, 2] \rightarrow 0}.

$$\text{DKS}\left[0, \frac{1}{24} \overline{\overline{t_{13} t_{23}}}, 0, -\frac{7 \overline{\overline{t_{13} t_{23} t_{23} t_{23}}}}{5760} + \frac{7 \overline{\overline{t_{13} t_{13} t_{23} t_{23}}}}{5760} - \frac{\overline{\overline{t_{13} t_{13} t_{13} t_{23}}}}{1440}, \right.$$

$$0, \frac{31 \overline{\overline{t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}}}{967680} - \frac{157 \overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23}}}}{1935360} - \frac{31 \overline{\overline{t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}}}{387072} -$$

$$\frac{31 \overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{23} t_{23}}}}{483840} + \frac{11 \overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{13} t_{23}}}}{290304} + \frac{31 \overline{\overline{t_{13} t_{13} t_{23} t_{13} t_{23} t_{23}}}}{725760} +$$

$$\left. \frac{83 \overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{23} t_{23}}}}{967680} - \frac{13 \overline{\overline{t_{13} t_{13} t_{13} t_{13} t_{23} t_{23}}}}{241920} + \frac{\overline{\overline{t_{13} t_{13} t_{13} t_{13} t_{13} t_{23}}}}{60480}, \dots \right]$$

The same thing, copy-paste ready and machine readable:

```
Sum[ $\Phi$ _0[k], {k, 6}] // InputForm
DK[3, LW[1, 2]/24 - LW[1, 1, 1, 2]/1440 + (7*LW[1, 1, 2, 2])/5760 - (7*LW[1, 2, 2, 2] + LW[1, 1, 1, 1, 1, 2])/60480 - (13*LW[1, 1, 1, 1, 2, 2])/241920 + (11*LW[1, 1, 1, 2, (83*LW[1, 1, 1, 2, 2, 2])/967680 + (31*LW[1, 1, 2, 1, 2, 2])/725760 - (157*LW[1, 1 (31*LW[1, 1, 2, 2, 2, 2])/483840 - (31*LW[1, 2, 1, 2, 2, 2])/387072 + (31*LW[1, 2,
```

Note that in this context, "LW[1, 1, 2, 2]" (for example) really means "LW[t₁₃, t₁₃, t₂₃, t₂₃"]

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 $\Phi$ _0@{10}
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Arbitrarily setting $\{\Phi_s[3, 1, 1, 1, 1, 1, 1, 2] \rightarrow 0\}$.

Arbitrarily setting $\{\Phi_s[3, 1, 1, 1, 1, 1, 1, 2, 1, 2] \rightarrow 0\}$.

Arbitrarily setting $\{\Phi_s[3, 1, 1, 1, 1, 1, 1, 1, 1, 2] \rightarrow 0\}$.

Arbitrarily setting $\{\Phi_s[3, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 2] \rightarrow 0\}$.

$$\begin{aligned}
 & \text{DKS} \left[0, \frac{1}{24} \overline{\overline{\overline{\overline{t_{13} t_{23}}}}} \right], 0, -\frac{7 \overline{\overline{\overline{\overline{t_{13} t_{23} t_{23} t_{23}}}}}}{5760} + \frac{7 \overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23}}}}}}{5760} - \frac{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23}}}}}}{1440}, \\
 & 0, \frac{31 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}}}}}}}}{967\,680} - \frac{157 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23}}}}}}}}}{1\,935\,360} - \frac{31 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}}}}}}}}{387\,072} - \\
 & \frac{31 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{23} t_{23}}}}}}}}}{483\,840} + \frac{11 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{13} t_{23}}}}}}}}}{290\,304} + \frac{31 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{13} t_{23} t_{23}}}}}}}}}{725\,760} + \\
 & \frac{83 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{23} t_{23}}}}}}}}}{967\,680} - \frac{13 \overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{13} t_{23} t_{23}}}}}}}}}{241\,920} + \frac{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{13} t_{13} t_{23}}}}}}}}}{60\,480}, \\
 & 0, -\frac{127 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}}}}}}}}}}}{154\,828\,800} + \frac{503 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23}}}}}}}}}}}{69\,672\,960} + \\
 & \frac{71 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}}}}}}}}}}}{9\,289\,728} + \frac{127 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23}}}}}}}}}}}{22\,118\,400} + \\
 & \frac{3613 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23}}}}}}}}}}}{464\,486\,400} + \frac{7 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23}}}}}}}}}}}{737\,280} + \\
 & \frac{107 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23}}}}}}}}}}}{29\,030\,400} - \frac{251 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23}}}}}}}}}}}{116\,121\,600} - \\
 & \frac{881 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{23}}}}}}}}}}}{174\,182\,400} - \frac{209 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23}}}}}}}}}}}{51\,609\,600} + \\
 & \frac{127 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}}}}}}}}}}{22\,118\,400} - \frac{199 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}}}}}}}}}}{21\,772\,800} + \\
 & \frac{127 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}}}}}}}}}}}{51\,609\,600} - \frac{367 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23}}}}}}}}}}}{69\,672\,960} - \\
 & \frac{6439 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}}}}}}}}}}}{696\,729\,600} - \frac{25\,577 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23}}}}}}}}}}}{1\,393\,459\,200} - \\
 & \frac{55 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}}}}}}}}}}}{3\,981\,312} + \frac{163 \overline{\overline{\overline{\overline{\overline{\overline{\overline{\overline{t_{13} t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23}}}}}}}}}}}{58\,060\,800} +
 \end{aligned}$$

$$\begin{aligned}
 & \frac{67 t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23}}{11\,612\,160} - \frac{2003 t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23}}{139\,345\,920} + \\
 & \frac{673 t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23}}{43\,545\,600} - \frac{2399 t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}{464\,486\,400} + \\
 & \frac{2693 t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23}}{348\,364\,800} + \frac{15\,859 t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}{1\,393\,459\,200} + \\
 & \frac{2893 t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23}}{464\,486\,400} - \frac{1007 t_{13} t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23}}{348\,364\,800} - \\
 & \frac{271 t_{13} t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{23}}{58\,060\,800} + \frac{19 t_{13} t_{13} t_{13} t_{13} t_{13} t_{13} t_{23} t_{23}}{9\,676\,800} - \frac{t_{13} t_{13} t_{13} t_{13} t_{13} t_{13} t_{13} t_{23}}{2\,419\,200}, \\
 0, & \frac{73 t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}}{3\,503\,554\,560} - \frac{117\,347 t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23}}{91\,968\,307\,200} - \\
 & \frac{511 t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}{1\,167\,851\,520} - \frac{1\,055\,083 t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23}}{735\,746\,457\,600} - \\
 & \frac{1\,023\,721 t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23}}{245\,248\,819\,200} - \frac{2\,510\,923 t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23}}{2\,207\,239\,372\,800} - \\
 & \frac{199 t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}}{232\,243\,200} + \frac{19\,847 t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23}}{91\,968\,307\,200} + \\
 & \frac{66\,301 t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23}}{183\,936\,614\,400} - \frac{4561 t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23}}{1\,916\,006\,400} - \\
 & \frac{23\,239 t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}}{22\,295\,347\,200} - \frac{73 t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}}{145\,981\,440} + \\
 & \frac{39\,043 t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}}{30\,656\,102\,400} - \frac{5947 t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23}}{11\,678\,515\,200} - \\
 & \frac{4751 t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23}}{5\,839\,257\,600} - \frac{841 t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}}{875\,888\,640}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{2437 \overbrace{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23}}}{7431782400} - \frac{8269 \overbrace{t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23}}}{6131220480} + \\
 & \frac{206323 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{13} t_{23}}}{183936614400} + \frac{132277 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23}}}{122624409600} - \\
 & \frac{213901 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23}}}{122624409600} + \frac{85363 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23}}}{245248819200} + \\
 & \frac{41 \overbrace{t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23}}}{56770560} + \frac{2929 \overbrace{t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}}{6812467200} + \\
 & \frac{3653 \overbrace{t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23}}}{8758886400} + \frac{94807 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{13} t_{23}}}{245248819200} + \\
 & \frac{6049 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23}}}{17517772800} + \frac{2273 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23}}}{16349921280} + \\
 & \frac{266111 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{13} t_{23}}}{735746457600} - \frac{863 \overbrace{t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{13} t_{23}}}{15328051200} - \\
 & \frac{6679 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{13} t_{23} t_{13} t_{23}}}{22992076800} - \frac{199 \overbrace{t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{13} t_{23} t_{23} t_{23}}}{1277337600} + \\
 & \frac{313739 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23}}}{2207239372800} + \frac{365903 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23}}}{183936614400} + \\
 & \frac{279221 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}}}{245248819200} - \frac{350419 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23}}}{735746457600} + \\
 & \frac{1973 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}}{3892838400} - \frac{24961 \overbrace{t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}}}{61312204800} - \\
 & \frac{73 \overbrace{t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}}}{259522560} + \frac{320863 \overbrace{t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}}}{122624409600} + \\
 & \frac{19183 \overbrace{t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23}}}{11678515200} + \frac{238369 \overbrace{t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}}}{147149291520} -
 \end{aligned}$$

$$\begin{array}{r}
 \overline{6445 t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23}} - \overline{73 t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}} + \\
 \hline
 2\ 675\ 441\ 664 \qquad \qquad \qquad 875\ 888\ 640 \\
 \\
 \overline{41 t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23}} + \overline{79\ 559 t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23}} + \\
 \hline
 1\ 724\ 405\ 760 \qquad \qquad \qquad 91\ 968\ 307\ 200 \\
 \\
 \overline{36\ 791 t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23}} + \overline{454\ 001 t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23}} - \\
 \hline
 12\ 262\ 440\ 960 \qquad \qquad \qquad 147\ 149\ 291\ 520 \\
 \\
 \overline{29\ 173 t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23}} + \overline{20\ 683 t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23}} + \\
 \hline
 147\ 149\ 291\ 520 \qquad \qquad \qquad 2\ 874\ 009\ 600 \\
 \\
 \overline{88\ 439 t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23}} + \overline{1\ 464\ 809 t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23}} + \\
 \hline
 40\ 874\ 803\ 200 \qquad \qquad \qquad 735\ 746\ 457\ 600 \\
 \\
 \overline{42\ 221 t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23}} + \overline{27\ 367 t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}} - \\
 \hline
 11\ 496\ 038\ 400 \qquad \qquad \qquad 13\ 624\ 934\ 400 \\
 \\
 \overline{3851 t_{13} t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{13} t_{23}} - \overline{6289 t_{13} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{13} t_{23}} + \\
 \hline
 3\ 832\ 012\ 800 \qquad \qquad \qquad 3\ 185\ 049\ 600 \\
 \\
 \overline{133\ 009 t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23}} - \overline{30\ 853 t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23}} - \\
 \hline
 122\ 624\ 409\ 600 \qquad \qquad \qquad 35\ 035\ 545\ 600 \\
 \\
 \overline{38\ 989 t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{23} t_{13} t_{13} t_{23}} - \overline{2629 t_{13} t_{13} t_{13} t_{13} t_{23} t_{23} t_{13} t_{13} t_{23} t_{23}} + \\
 \hline
 35\ 035\ 545\ 600 \qquad \qquad \qquad 4\ 459\ 069\ 440 \\
 \\
 \overline{311 t_{13} t_{13} t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{13} t_{23}} + \overline{629 t_{13} t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{13} t_{23} t_{23}} - \\
 \hline
 2\ 554\ 675\ 200 \qquad \qquad \qquad 1\ 703\ 116\ 800 \\
 \\
 \overline{352\ 211 t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{13} t_{23}} - \overline{19\ 069 t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{23} t_{23} t_{23}} + \\
 \hline
 183\ 936\ 614\ 400 \qquad \qquad \qquad 13\ 624\ 934\ 400 \\
 \\
 \overline{631\ 669 t_{13} t_{13} t_{13} t_{23} t_{13} t_{13} t_{23} t_{13} t_{23} t_{23}} + \overline{26\ 947 t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23} t_{23} t_{23}} - \\
 \hline
 735\ 746\ 457\ 600 \qquad \qquad \qquad 22\ 992\ 076\ 800 \\
 \\
 \overline{14\ 669 t_{13} t_{13} t_{23} t_{13} t_{23} t_{23} t_{13} t_{23} t_{23} t_{23}} - \overline{391 t_{13} t_{13} t_{23} t_{13} t_{23} t_{13} t_{23} t_{23} t_{23} t_{23}} + \\
 \hline
 13\ 138\ 329\ 600 \qquad \qquad \qquad 87\ 588\ 864
 \end{array}$$

$$\begin{array}{r}
 \overline{42\,709\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}} + \overline{1621\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} \\
 \hline
 45\,984\,153\,600 \qquad \qquad \qquad 6\,812\,467\,200 \\
 \\
 \overline{172\,429\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}} - \overline{247\,139\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{23}} \\
 \hline
 147\,149\,291\,520 \qquad \qquad \qquad 147\,149\,291\,520 \\
 \\
 \overline{152\,261\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} - \overline{127\,823\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{13}\, t_{23}} \\
 \hline
 91\,968\,307\,200 \qquad \qquad \qquad 52\,553\,318\,400 \\
 \\
 \overline{1547\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{23}} + \overline{52\,153\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}} \\
 \hline
 547\,430\,400 \qquad \qquad \qquad 61\,312\,204\,800 \\
 \\
 \overline{1037\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{13}\, t_{23}} - \overline{16\,501\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}} \\
 \hline
 1\,703\,116\,800 \qquad \qquad \qquad 91\,968\,307\,200 \\
 \\
 \overline{71\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}} - \overline{55\,163\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} \\
 \hline
 72\,990\,720 \qquad \qquad \qquad 30\,656\,102\,400 \\
 \\
 \overline{351\,163\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{23}} - \overline{12\,941\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} \\
 \hline
 147\,149\,291\,520 \qquad \qquad \qquad 30\,656\,102\,400 \\
 \\
 \overline{t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}} + \overline{18\,811\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{23}} \\
 \hline
 14\,598\,144 \qquad \qquad \qquad 45\,984\,153\,600 \\
 \\
 \overline{91\,661\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{13}\, t_{23}} + \overline{45\,701\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}\, t_{23}} \\
 \hline
 66\,886\,041\,600 \qquad \qquad \qquad 91\,968\,307\,200 \\
 \\
 \overline{569\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{13}\, t_{23}} - \overline{3841\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{13}\, t_{23}\, t_{23}} \\
 \hline
 7\,664\,025\,600 \qquad \qquad \qquad 15\,328\,051\,200 \\
 \\
 \overline{1\,117\,661\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} - \overline{424\,531\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{13}\, t_{23}\, t_{23}} \\
 \hline
 735\,746\,457\,600 \qquad \qquad \qquad 735\,746\,457\,600 \\
 \\
 \overline{2281\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{23}\, t_{23}\, t_{23}} - \overline{6187\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{13}\, t_{23}\, t_{23}\, t_{13}\, t_{23}} \\
 \hline
 4\,541\,644\,800 \qquad \qquad \qquad 22\,992\,076\,800
 \end{array}$$

$$\begin{aligned}
 & \frac{211\,187\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}\,t_{13}\,t_{23}\,t_{23}\,t_{23}}{245\,248\,819\,200} - \frac{6103\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}\,t_{23}\,t_{23}\,t_{23}}{15\,328\,051\,200} + \\
 & \frac{11\,903\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}\,t_{13}\,t_{23}\,t_{23}}{45\,984\,153\,600} + \frac{59\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}\,t_{23}\,t_{23}}{283\,852\,800} - \\
 & \frac{5\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}\,t_{23}}{76\,640\,256} + \frac{t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{13}\,t_{23}}{95\,800\,320}, \dots]
 \end{aligned}$$

The same thing, copy-paste ready and machine readable:

Sum[$\mathfrak{a}_0[k]$, {k, 10}] // InputForm

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DK[3, LW[1, 2]/24 - LW[1, 1, 1, 2]/1440 + (7*LW[1, 1, 2, 2])/5760 - (7*LW[1, 2, 2, 2]
LW[1, 1, 1, 1, 1, 2]/60480 - (13*LW[1, 1, 1, 1, 2, 2])/241920 + (11*LW[1, 1, 1, 2,
(83*LW[1, 1, 1, 2, 2, 2])/967680 + (31*LW[1, 1, 2, 1, 2, 2])/725760 - (157*LW[1, 1
(31*LW[1, 1, 2, 2, 2, 2])/483840 - (31*LW[1, 2, 1, 2, 2, 2])/387072 + (31*LW[1, 2,
LW[1, 1, 1, 1, 1, 1, 1, 2]/2419200 + (19*LW[1, 1, 1, 1, 1, 1, 2, 2])/9676800 -
(271*LW[1, 1, 1, 1, 1, 2, 2, 2])/58060800 + (163*LW[1, 1, 1, 1, 2, 1, 1, 2])/58060
(1007*LW[1, 1, 1, 1, 2, 1, 2, 2])/348364800 + (2693*LW[1, 1, 1, 1, 2, 2, 1, 2])/34
(2893*LW[1, 1, 1, 1, 2, 2, 2, 2])/464486400 + (67*LW[1, 1, 1, 2, 1, 1, 2, 2])/1161
(367*LW[1, 1, 1, 2, 1, 2, 1, 2])/69672960 + (15859*LW[1, 1, 1, 2, 1, 2, 2, 2])/139
(251*LW[1, 1, 1, 2, 2, 1, 1, 2])/116121600 - (55*LW[1, 1, 1, 2, 2, 1, 2, 2])/39813
(25577*LW[1, 1, 1, 2, 2, 2, 1, 2])/1393459200 - (2399*LW[1, 1, 1, 2, 2, 2, 2, 2]),
(881*LW[1, 1, 2, 1, 1, 2, 1, 2])/174182400 - (209*LW[1, 1, 2, 1, 1, 2, 2, 2])/5160
(673*LW[1, 1, 2, 1, 2, 1, 2, 2])/43545600 + (107*LW[1, 1, 2, 1, 2, 2, 1, 2])/29030
(2003*LW[1, 1, 2, 1, 2, 2, 2, 2])/139345920 + (503*LW[1, 1, 2, 2, 1, 2, 1, 2])/696
(6439*LW[1, 1, 2, 2, 1, 2, 2, 2])/696729600 + (7*LW[1, 1, 2, 2, 2, 1, 2, 2])/73728
(3613*LW[1, 1, 2, 2, 2, 2, 1, 2])/464486400 + (127*LW[1, 1, 2, 2, 2, 2, 2, 2])/516
(199*LW[1, 2, 1, 2, 1, 2, 2, 2])/21772800 + (71*LW[1, 2, 1, 2, 2, 1, 2, 2])/928972
(127*LW[1, 2, 1, 2, 2, 2, 2, 2])/22118400 + (127*LW[1, 2, 2, 1, 2, 2, 2, 2])/22118
(127*LW[1, 2, 2, 2, 2, 2, 2, 2])/154828800 + LW[1, 1, 1, 1, 1, 1, 1, 1, 1, 2]/9580
(5*LW[1, 1, 1, 1, 1, 1, 1, 1, 2, 2])/76640256 + (59*LW[1, 1, 1, 1, 1, 1, 1, 2, 2,
(569*LW[1, 1, 1, 1, 1, 1, 2, 1, 1, 2])/7664025600 + (11903*LW[1, 1, 1, 1, 1, 1, 2,
(6187*LW[1, 1, 1, 1, 1, 1, 2, 2, 1, 2])/22992076800 - (6103*LW[1, 1, 1, 1, 1, 1, 2,
(311*LW[1, 1, 1, 1, 1, 2, 1, 1, 1, 2])/2554675200 - (3841*LW[1, 1, 1, 1, 1, 2, 1,
LW[1, 1, 1, 1, 1, 2, 1, 2, 1, 2]/14598144 - (211187*LW[1, 1, 1, 1, 1, 2, 1, 2, 2,
(1037*LW[1, 1, 1, 1, 1, 2, 2, 1, 1, 2])/1703116800 + (45701*LW[1, 1, 1, 1, 1, 2, 2,
(91661*LW[1, 1, 1, 1, 1, 2, 2, 2, 1, 2])/66886041600 + (2281*LW[1, 1, 1, 1, 1, 2,
(629*LW[1, 1, 1, 1, 2, 1, 1, 1, 2, 2])/1703116800 - (16501*LW[1, 1, 1, 1, 2, 1, 1,
(71*LW[1, 1, 1, 1, 2, 1, 1, 2, 2, 2])/72990720 - (3851*LW[1, 1, 1, 1, 2, 1, 2, 1,
(424531*LW[1, 1, 1, 1, 2, 1, 2, 1, 2, 2])/735746457600 + (52153*LW[1, 1, 1, 1, 2,
(1117661*LW[1, 1, 1, 1, 2, 1, 2, 2, 2, 2])/735746457600 - (863*LW[1, 1, 1, 1, 2, 2,
(2629*LW[1, 1, 1, 1, 2, 2, 1, 1, 2, 2])/4459069440 - (172429*LW[1, 1, 1, 1, 2, 2,
(18811*LW[1, 1, 1, 1, 2, 2, 1, 2, 2, 2])/45984153600 - (38989*LW[1, 1, 1, 1, 2, 2,
(1547*LW[1, 1, 1, 1, 2, 2, 2, 1, 2, 2])/547430400 - (127823*LW[1, 1, 1, 1, 2, 2, 2,
(12941*LW[1, 1, 1, 1, 2, 2, 2, 2, 2, 2])/30656102400 - (6679*LW[1, 1, 1, 2, 1, 1,

```

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(199*LW[1, 1, 1, 2, 1, 1, 1, 2, 2, 2])/1277337600 + (19847*LW[1, 1, 1, 2, 1, 1, 2,
(631669*LW[1, 1, 1, 2, 1, 1, 2, 1, 2, 2])/735746457600 - (352211*LW[1, 1, 1, 2, 1,
(19069*LW[1, 1, 1, 2, 1, 1, 2, 2, 2, 2])/13624934400 - (29173*LW[1, 1, 1, 2, 1, 2,
(41*LW[1, 1, 1, 2, 1, 2, 1, 2, 1, 2])/1724405760 + (351163*LW[1, 1, 1, 2, 1, 2, 1,
(2273*LW[1, 1, 1, 2, 1, 2, 2, 1, 1, 2])/16349921280 - (247139*LW[1, 1, 1, 2, 1, 2,
(6289*LW[1, 1, 1, 2, 1, 2, 2, 2, 1, 2])/3185049600 - (55163*LW[1, 1, 1, 2, 1, 2, 2,
(266111*LW[1, 1, 1, 2, 2, 1, 1, 2, 1, 2])/735746457600 - (30853*LW[1, 1, 1, 2, 2,
(206323*LW[1, 1, 1, 2, 2, 1, 2, 1, 1, 2])/183936614400 + (133009*LW[1, 1, 1, 2, 2,
(454001*LW[1, 1, 1, 2, 2, 1, 2, 2, 1, 2])/147149291520 - (152261*LW[1, 1, 1, 2, 2,
(6049*LW[1, 1, 1, 2, 2, 2, 1, 1, 2, 2])/17517772800 + (36791*LW[1, 1, 1, 2, 2, 2,
(27367*LW[1, 1, 1, 2, 2, 2, 1, 2, 2, 2])/13624934400 + (94807*LW[1, 1, 1, 2, 2, 2,
(42221*LW[1, 1, 1, 2, 2, 2, 2, 1, 2, 2])/11496038400 + (1464809*LW[1, 1, 1, 2, 2,
(1621*LW[1, 1, 1, 2, 2, 2, 2, 2, 2, 2])/6812467200 - (350419*LW[1, 1, 2, 1, 1, 2,
(313739*LW[1, 1, 2, 1, 1, 2, 1, 2, 1, 2])/2207239372800 - (24961*LW[1, 1, 2, 1, 1,
(279221*LW[1, 1, 2, 1, 1, 2, 2, 1, 2, 2])/245248819200 + (365903*LW[1, 1, 2, 1, 1,
(1973*LW[1, 1, 2, 1, 1, 2, 2, 2, 2, 2])/3892838400 + (66301*LW[1, 1, 2, 1, 2, 1, 1,
(42709*LW[1, 1, 2, 1, 2, 1, 2, 1, 2, 2])/45984153600 - (213901*LW[1, 1, 2, 1, 2, 1,
(391*LW[1, 1, 2, 1, 2, 1, 2, 2, 2, 2])/87588864 + (85363*LW[1, 1, 2, 1, 2, 2, 1, 1,
(2510923*LW[1, 1, 2, 1, 2, 2, 1, 2, 1, 2])/2207239372800 - (14669*LW[1, 1, 2, 1, 2,
(20683*LW[1, 1, 2, 1, 2, 2, 2, 1, 2, 2])/2874009600 + (132277*LW[1, 1, 2, 1, 2, 2,
(26947*LW[1, 1, 2, 1, 2, 2, 2, 2, 2, 2])/22992076800 + (41*LW[1, 1, 2, 2, 1, 1, 2,
(3653*LW[1, 1, 2, 2, 1, 1, 2, 2, 2, 2])/8758886400 - (117347*LW[1, 1, 2, 2, 1, 2,
(2929*LW[1, 1, 2, 2, 1, 2, 1, 2, 2, 2])/6812467200 - (199*LW[1, 1, 2, 2, 1, 2, 2,
(2437*LW[1, 1, 2, 2, 1, 2, 2, 2, 1, 2])/7431782400 + (88439*LW[1, 1, 2, 2, 1, 2, 2,
(8269*LW[1, 1, 2, 2, 2, 1, 2, 1, 2, 2])/6131220480 - (1023721*LW[1, 1, 2, 2, 2, 1,
(79559*LW[1, 1, 2, 2, 2, 1, 2, 2, 2, 2])/91968307200 - (1055083*LW[1, 1, 2, 2, 2,
(841*LW[1, 1, 2, 2, 2, 2, 1, 2, 2, 2])/875888640 - (4751*LW[1, 1, 2, 2, 2, 2, 2, 1,
(5947*LW[1, 1, 2, 2, 2, 2, 2, 2, 1, 2])/11678515200 - (73*LW[1, 1, 2, 2, 2, 2, 2,
(6445*LW[1, 2, 1, 2, 1, 2, 1, 2, 2, 2])/2675441664 + (320863*LW[1, 2, 1, 2, 1, 2,
(238369*LW[1, 2, 1, 2, 1, 2, 2, 2, 2, 2])/147149291520 + (19183*LW[1, 2, 1, 2, 2,
(23239*LW[1, 2, 1, 2, 2, 2, 1, 2, 2, 2])/22295347200 - (4561*LW[1, 2, 1, 2, 2, 2,
(73*LW[1, 2, 1, 2, 2, 2, 2, 2, 2, 2])/259522560 + (39043*LW[1, 2, 2, 1, 2, 2, 1, 2,
(73*LW[1, 2, 2, 1, 2, 2, 2, 2, 2, 2])/145981440 - (511*LW[1, 2, 2, 2, 1, 2, 2, 2,
(73*LW[1, 2, 2, 2, 2, 2, 2, 2, 2, 2])/3503554560

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{TimeUsed[], MaxMemoryUsed[]}
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{28 670.1, 356 531 960}
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