

Pensieve header: Solving for V alone (with Kuno). Continued pensieve://People/Kuno.

```
In[*]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\WKO4"];
<< FreeLie.m;
<< AwCalculus.m;
Rs[a_, b_] := Es[⟨a → LS[0], b → LS[LW@a]⟩, CWS[0]];
α = LS[{x, y}, αs]; β = LS[{x, y}, βs]; γ = CWS[{x, y}, γs];
V = Es[⟨x → α, y → β⟩, γ];
R4Eqn = V ** (Rs[x, z] // dΔ[x, x, y]) ≡ Rs[y, z] ** Rs[x, z] ** V;
βs[x] = 1 / 2; βs[y] = 0; γs[___] = 0;
SeriesSolve[{α, β, γ}, (h^-1 R4Eqn)];
V
```

FreeLie` implements / extends {*, +, **, \$SeriesShowDegree, ⟨⟩, ∫, ≡, ad, Ad, adSeries, AllCyclicWords, AllLyndonWords, AllWords, Arbitrator, ASeries, AW, b, BCH, BooleanSequence, BracketForm, BS, CC, Crop, cw, CW, CWS, CWSeries, D, Deg, DegreeScale, DerivationSeries, div, DK, DKS, DKSeries, 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, αMap, Γ, ℓ, Δ, σ, ħ, ↦, ↵}.

FreeLie` is in the public domain. Dror Bar-Natan is committed to support it within reason until July 15, 2022. This is version 150814.

AwCalculus` implements / extends {*, **, ≡, dA, dc, deg, dm, dS, dΔ, dη, dσ, El, Es, hA, hm, hS, hΔ, hη, hσ, RandomElSeries, RandomEsSeries, tA, tha, tm, tS, tΔ, tη, tσ, Γ, Δ}.

AwCalculus` is in the public domain. Dror Bar-Natan is committed to support it within reason until July 15, 2022. This is version 150909.

SeriesSolve: In degree 1 arbitrarily setting {αs[x] → 0}.

SeriesSolve: In degree 3 arbitrarily setting {αs[x, y] → 0}.

Out[*]=

$$Es \left[\left\langle x \rightarrow LS \left[0, -\frac{\overline{xy}}{24}, 0, \dots \right], y \rightarrow LS \left[\frac{\overline{x}}{2}, -\frac{\overline{xy}}{12}, 0, \dots \right] \right\rangle, CWS[0, 0, 0, \dots] \right]$$

In[*]:= V@{8} // Timing

SeriesSolve: In degree 5 arbitrarily setting {αs[x, x, y, x, y] → 0, βs[x, x, x, y, y] → 0, βs[x, x, y, y, y] → 0}.

SeriesSolve: In degree 7 arbitrarily setting

$$\{\alpha s[x, x, x, y, x, x, y] \rightarrow 0, \alpha s[x, x, y, y, x, y, y] \rightarrow 0, \beta s[x, x, x, x, y, x, y] \rightarrow 0, \beta s[x, x, x, y, y, x, y] \rightarrow 0, \beta s[x, x, y, y, x, y, y] \rightarrow 0, \beta s[x, y, x, y, y, y, y] \rightarrow 0\}$$

SeriesSolve: In degree 8 arbitrarily setting

$$\{\alpha s[x, x, y, x, y, x, y, y] \rightarrow 0, \beta s[x, x, x, x, x, y, x, y] \rightarrow 0, \beta s[x, x, y, x, y, x, y, y] \rightarrow 0, \beta s[x, y, x, y, x, y, y, y] \rightarrow 0\}$$

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

Out[*]=

$$\{3.82813,$$

$$\begin{aligned}
 \text{Es} \left[\left(x \rightarrow \text{LS} \left[0, -\frac{\overline{xy}}{24}, 0, \frac{7 \times \overline{xxxy}}{5760} - \frac{7 \times \overline{xyy}}{5760} + \frac{\overline{xyyy}}{1440}, -\frac{\overline{xyyy}}{3840} - \frac{\overline{xyxyy}}{2560}, -\frac{31 \times \overline{xxxxy}}{967680} + \right. \right. \\
 \frac{31 \times \overline{xxxxyy}}{483840} - \frac{83 \times \overline{xxxyyy}}{967680} - \frac{31 \times \overline{xyxyy}}{725760} - \frac{31 \times \overline{xxxyxy}}{645120} + \frac{13 \times \overline{xyyyyy}}{241920} + \frac{101 \times \overline{xyxyyy}}{1451520} + \\
 \frac{527 \times \overline{xyxyxy}}{5806080} - \frac{\overline{xyyyyy}}{60480}, \frac{463 \times \overline{xxxxyy}}{11612160} + \frac{143 \times \overline{xxxyxy}}{4644864} + \frac{43 \times \overline{xxxyyy}}{7741440} + \\
 \frac{\overline{xyxyyy}}{30240} - \frac{337 \times \overline{xxxyxy}}{2903040} + \frac{157 \times \overline{xyxyxy}}{4644864} - \frac{337 \times \overline{xyxyxy}}{4644864} + \\
 \frac{53 \times \overline{xyxyxy}}{1935360} + \frac{337 \times \overline{xxxyxyxy}}{11612160}, \frac{127 \times \overline{xxxxxy}}{154828800} - \frac{127 \times \overline{xxxxxy}}{51609600} + \\
 \frac{2399 \times \overline{xxxxyy}}{464486400} + \frac{31 \times \overline{xxxxyxy}}{232243200} + \frac{127 \times \overline{xxxxyxy}}{30965760} - \frac{2893 \times \overline{xxxxyyy}}{464486400} - \\
 \frac{10057 \times \overline{xxxyxyyy}}{836075520} - \frac{4129 \times \overline{xxxxyxy}}{232243200} + \frac{271 \times \overline{xxxyyyy}}{58060800} + \frac{2567 \times \overline{xyxyyy}}{99532800} - \\
 \frac{1247 \times \overline{xxxyxy}}{278691840} - \frac{127 \times \overline{xxxyxy}}{77414400} - \frac{127 \times \overline{xxxyxy}}{77414400} + \frac{449 \times \overline{xxxyyy}}{66355200} - \\
 \frac{407 \times \overline{xyxyxyyy}}{33177600} + \frac{13 \times \overline{xxxyxyxy}}{1720320} - \frac{19 \times \overline{xyyyyyy}}{9676800} + \frac{5269 \times \overline{xyxyxyyy}}{69672960} + \\
 \frac{7 \times \overline{xyxyyyy}}{622080} + \frac{35801 \times \overline{xyxyxy}}{4180377600} + \frac{\overline{xyxyxy}}{226800} + \frac{151 \times \overline{xxxyxy}}{49766400} + \\
 \frac{127 \times \overline{xyxyxy}}{12902400} - \frac{61079 \times \overline{xyyyxy}}{696729600} - \frac{16297 \times \overline{xyyyxy}}{696729600} + \\
 \left. \frac{6121 \times \overline{xyxyxyyy}}{174182400} - \frac{12241 \times \overline{xyxyxy}}{232243200} + \frac{401 \times \overline{xyxyxyxy}}{43545600} + \frac{\overline{xyyyyyy}}{2419200}, \dots \right],
 \end{aligned}$$

$$\begin{aligned}
 y \rightarrow \text{LS} & \left[\frac{\overline{\overline{\overline{x}}}}{2}, -\frac{\overline{\overline{\overline{xy}}}}{12}, 0, \frac{\overline{\overline{\overline{xxxxy}}}}{5760} - \frac{1}{720} \overline{\overline{\overline{xyy}}}, + \frac{1}{720} \overline{\overline{\overline{xyyy}}}, - \frac{\overline{\overline{\overline{xxxxy}}}}{7680} - \frac{19}{69120} \overline{\overline{\overline{xyxy}}}, \right. \\
 & - \frac{\overline{\overline{\overline{xxxxxy}}}}{645120} - \frac{\overline{\overline{\overline{17xxxxyy}}}}{967680} + \frac{\overline{\overline{\overline{xxxyyy}}}}{20160} + \frac{\overline{\overline{\overline{439xyxyy}}}}{2903040} - \frac{\overline{\overline{\overline{599xxxxyxy}}}}{5806080} + \\
 & \frac{\overline{\overline{\overline{xyyy}}}}{15120} + \frac{\overline{\overline{\overline{xyxyy}}}}{12096} + \frac{\overline{\overline{\overline{71xyxyxy}}}}{483840} - \frac{\overline{\overline{\overline{xyyyy}}}}{30240}, \frac{\overline{\overline{\overline{xxxxxy}}}}{258048} + \frac{\overline{\overline{\overline{31xxxxxyy}}}}{2903040} + \\
 & \frac{\overline{\overline{\overline{83xxxxyyy}}}}{1548288} + \frac{\overline{\overline{\overline{671xxxxyxyy}}}}{7741440} - \frac{\overline{\overline{\overline{31xxxxyyy}}}}{967680} - \frac{\overline{\overline{\overline{383xyxyxyy}}}}{5806080} - \frac{\overline{\overline{\overline{xyxyxyy}}}}{30720} + \\
 & \frac{\overline{\overline{\overline{17xyxyxyy}}}}{23224320} - \frac{\overline{\overline{\overline{29xxxxyxyxy}}}}{1548288} + \frac{\overline{\overline{\overline{11xyyyxyxy}}}}{414720} + \frac{\overline{\overline{\overline{43xyxyxyxy}}}}{11612160}, \\
 & \frac{\overline{\overline{\overline{xxxxxy}}}}{77414400} + \frac{\overline{\overline{\overline{2783xxxxxyy}}}}{464486400} - \frac{\overline{\overline{\overline{383xxxxxyyy}}}}{58060800} + \frac{\overline{\overline{\overline{223xxxxyxyy}}}}{4180377600} - \\
 & \frac{\overline{\overline{\overline{3281xxxxyyy}}}}{232243200} - \frac{\overline{\overline{\overline{737xxxxyxyyy}}}}{33177600} + \frac{\overline{\overline{\overline{8009xxxxyxyxy}}}}{232243200} + \frac{\overline{\overline{\overline{73xxxxyyyy}}}}{14515200} + \\
 & \frac{\overline{\overline{\overline{793xyxyyy}}}}{29030400} + \frac{\overline{\overline{\overline{289xxxxyxyxy}}}}{8164800} - \frac{\overline{\overline{\overline{4679xxxxyxyxy}}}}{696729600} - \frac{\overline{\overline{\overline{4217xxxxyxyxy}}}}{116121600} + \\
 & \frac{\overline{\overline{\overline{739xxxxyxyxyxy}}}}{99532800} + \frac{\overline{\overline{\overline{4751xyxyxyyy}}}}{174182400} - \frac{\overline{\overline{\overline{407xxxxyxyxyxy}}}}{92897280} - \frac{\overline{\overline{\overline{xyxyyyy}}}}{403200} - \frac{\overline{\overline{\overline{xyxyyyy}}}}{172800} + \\
 & \frac{\overline{\overline{\overline{47xyxyxyyy}}}}{6451200} + \frac{\overline{\overline{\overline{1009xyxyxyxyxy}}}}{597196800} + \frac{\overline{\overline{\overline{2701xxxxyxyxyxy}}}}{464486400} + \frac{\overline{\overline{\overline{11929xyxyxyxyxy}}}}{696729600} - \\
 & \frac{\overline{\overline{\overline{xyxyxyxyxy}}}}{92160} - \frac{\overline{\overline{\overline{151xyxyxyxyxyxy}}}}{14515200} - \frac{\overline{\overline{\overline{xyxyxyxyxy}}}}{172800} - \frac{\overline{\overline{\overline{2459xyxyxyxyxy}}}}{174182400} - \\
 & \left. \frac{\overline{\overline{\overline{2903xyxyxyxyxyxy}}}}{99532800} + \frac{\overline{\overline{\overline{xyxyxyxyxyxy}}}}{1209600}, \dots \right], \text{CWS}[0, 0, 0, 0, 0, 0, 0, 0, \dots] \}
 \end{aligned}$$

In[*]:= V@{10} // Timing

SeriesSolve: In degree 9 arbitrarily setting

$$\{\alpha s[x, x, x, x, y, x, x, x, y] \rightarrow 0, \alpha s[x, x, x, x, y, x, x, y, y] \rightarrow 0, \alpha s[x, x, x, y, x, y, x, y, y] \rightarrow 0, \alpha s[x, x, y, x, y, x, y, y, y] \rightarrow 0, \alpha s[x, x, y, y, x, y, y, y, y] \rightarrow 0, \alpha s[x, y, x, y, y, x, y, y, y] \rightarrow 0, \beta s[x, x, x, x, y, x, x, y] \rightarrow 0, \beta s[x, x, x, x, x, y, x, x, y] \rightarrow 0, \beta s[x, x, x, y, y, x, y, x, y] \rightarrow 0, \ll 3 \gg\}.$$

SeriesSolve: In degree 10 arbitrarily setting

$$\{\alpha s[x, x, x, x, x, x, y, x, y, y] \rightarrow 0, \alpha s[x, x, x, x, x, y, x, y, y, y] \rightarrow 0, \alpha s[x, x, x, x, y, x, x, y, y, y] \rightarrow 0, \alpha s[x, x, x, x, y, y, x, y, y, y] \rightarrow 0, \alpha s[x, x, x, x, y, y, y, x, y, y] \rightarrow 0, \alpha s[x, x, x, x, y, y, y, y, x, y] \rightarrow 0, \alpha s[x, x, x, x, y, y, y, y, y, x] \rightarrow 0, \alpha s[x, x, x, x, y, y, y, y, y, y] \rightarrow 0, \ll 2 \gg\}.$$

Out[*]=

{19.9375,

$$\begin{aligned} \text{Es} \left[\left(x \rightarrow \text{LS} \left[0, -\frac{\overline{\overline{\overline{\overline{xy}}}}}}{24}, 0, \frac{\overline{\overline{\overline{\overline{7 x x xy}}}}}{5760} - \frac{\overline{\overline{\overline{\overline{7 x xy y}}}}}{5760} + \frac{\overline{\overline{\overline{\overline{xy y y}}}}}{1440}, -\frac{\overline{\overline{\overline{\overline{x xy y y}}}}}{3840} - \frac{\overline{\overline{\overline{\overline{xy xy y}}}}}{2560}, -\frac{\overline{\overline{\overline{\overline{31 x x x xy}}}}}{967680} + \right. \right. \\ \frac{\overline{\overline{\overline{\overline{31 x x x xy y}}}}}{483840} - \frac{\overline{\overline{\overline{\overline{83 x x xy y y}}}}}{967680} - \frac{\overline{\overline{\overline{\overline{31 x xy xy y}}}}}{725760} - \frac{\overline{\overline{\overline{\overline{31 x x xy xy}}}}}{645120} + \frac{\overline{\overline{\overline{\overline{13 x xy y yy}}}}}{241920} + \frac{\overline{\overline{\overline{\overline{101 xy xy y y}}}}}{1451520} + \\ \frac{\overline{\overline{\overline{\overline{527 x xy y xy}}}}}{5806080} - \frac{\overline{\overline{\overline{\overline{xy y yy y}}}}}{60480}, \frac{\overline{\overline{\overline{\overline{463 x x xy y y}}}}}{11612160} + \frac{\overline{\overline{\overline{\overline{143 x x xy xy y}}}}}{4644864} + \frac{\overline{\overline{\overline{\overline{43 x x xy y yy}}}}}{7741440} + \\ \frac{\overline{\overline{\overline{\overline{x xy xy y y}}}}}{30240} - \frac{\overline{\overline{\overline{\overline{337 x x xy y xy}}}}}{2903040} + \frac{\overline{\overline{\overline{\overline{157 xy xy xy y}}}}}{4644864} - \frac{\overline{\overline{\overline{\overline{337 x xy x xy y}}}}}{4644864} + \\ \frac{\overline{\overline{\overline{\overline{53 x xy y xy y}}}}}{1935360} + \frac{\overline{\overline{\overline{\overline{337 x xy xy xy}}}}}{11612160}, \frac{\overline{\overline{\overline{\overline{127 x x x x xy}}}}}{154828800} - \frac{\overline{\overline{\overline{\overline{127 x x x x xy y}}}}}{51609600} + \\ \frac{\overline{\overline{\overline{\overline{2399 x x x x xy y y}}}}}{464486400} + \frac{\overline{\overline{\overline{\overline{31 x x x xy xy y}}}}}{232243200} + \frac{\overline{\overline{\overline{\overline{127 x x x xy xy}}}}}{30965760} - \frac{\overline{\overline{\overline{\overline{2893 x x x xy y yy}}}}}{464486400} - \\ \frac{\overline{\overline{\overline{\overline{10057 x x xy xy y y}}}}}{836075520} - \frac{\overline{\overline{\overline{\overline{4129 x x x xy y xy}}}}}{232243200} + \frac{\overline{\overline{\overline{\overline{271 x x xy y yy y}}}}}{58060800} + \frac{\overline{\overline{\overline{\overline{2567 x xy xy y yy}}}}}{99532800} - \\ \frac{\overline{\overline{\overline{\overline{1247 x x xy x xy y}}}}}{278691840} - \frac{\overline{\overline{\overline{\overline{127 x x x xy x xy}}}}}{77414400} - \frac{\overline{\overline{\overline{\overline{127 x x xy y xy y}}}}}{77414400} + \frac{\overline{\overline{\overline{\overline{449 x x xy y y xy}}}}}{66355200} - \\ \frac{\overline{\overline{\overline{\overline{407 x xy y xy y y}}}}}{33177600} + \frac{\overline{\overline{\overline{\overline{13 x x xy xy xy}}}}}{1720320} - \frac{\overline{\overline{\overline{\overline{19 x xy y yy yy}}}}}{9676800} + \frac{\overline{\overline{\overline{\overline{5269 xy xy xy y y}}}}}{69672960} + \end{aligned}$$

$$\begin{aligned}
 & \frac{7 \overline{xy \overline{xyy \overline{yyy}}}}{622080} + \frac{35801 \overline{x \overline{xy \overline{x \overline{xyy \overline{y}}}}} + \frac{x \overline{xy \overline{x \overline{xy \overline{xy}}}}}{226800} + \frac{151 \overline{xx \overline{xyy \overline{x \overline{xy}}}}}{49766400} + \\
 & \frac{127 \overline{x \overline{xy \overline{xyy \overline{xy}}}}}{12902400} - \frac{61079 \overline{x \overline{xyy \overline{y \overline{xyy}}}}}{696729600} - \frac{16297 \overline{x \overline{xyy \overline{yy \overline{xy}}}}}{696729600} + \\
 & \frac{6121 \overline{xyy \overline{xyy \overline{yy}}}}{174182400} - \frac{12241 \overline{xy \overline{xyy \overline{xyy}}}}{232243200} + \frac{401 \overline{x \overline{xyy \overline{xy \overline{xy}}}}}{43545600} + \frac{\overline{xyy \overline{yyyyy}}}{2419200}, \\
 & - \frac{2861 \overline{xxxxx \overline{xyy \overline{y}}}}{3715891200} - \frac{32489 \overline{xxxxx \overline{xy \overline{xyy}}}}{22295347200} - \frac{221429 \overline{xxxx \overline{xyy \overline{yy}}}}{33443020800} - \\
 & \frac{9071 \overline{xxx \overline{xy \overline{xyy \overline{y}}}}}{398131200} - \frac{337 \overline{xxxx \overline{xyy \overline{xy}}}}{278691840} + \frac{11917 \overline{xxx \overline{xyy \overline{yy}}}}{185794560} + \frac{224173 \overline{xx \overline{xy \overline{xyy \overline{yy}}}}}{1114767360} + \\
 & \frac{12281 \overline{xxx \overline{xyy \overline{xyy}}}}{8360755200} + \frac{10027 \overline{xxx \overline{xyy \overline{y \overline{xy}}}}}{334430208} + \frac{226067 \overline{xx \overline{xyy \overline{xyy \overline{y}}}}}{1857945600} + \\
 & \frac{3707 \overline{xx \overline{x \overline{xy \overline{xyy \overline{xy}}}}} - \frac{37297 \overline{xx \overline{xyy \overline{yyy}}}}{16721510400} + \frac{127877 \overline{x \overline{xy \overline{xy \overline{xyy \overline{y}}}}}{398131200} + \\
 & \frac{6401 \overline{x \overline{xy \overline{xyy \overline{yyy}}}}}{557383680} + \frac{567191 \overline{x \overline{x \overline{xy \overline{x \overline{xyy \overline{y}}}}} + \frac{337 \overline{x \overline{x \overline{xy \overline{x \overline{xy \overline{xy}}}}} + \frac{337 \overline{xxx \overline{xyy \overline{x \overline{xy}}}}}{74317824} + \\
 & \frac{1289537 \overline{xx \overline{xy \overline{xyy \overline{xy}}}}}{16721510400} - \frac{658883 \overline{xx \overline{xyy \overline{y \overline{xyy}}}}}{5573836800} - \frac{155917 \overline{xx \overline{xyy \overline{yy \overline{xy}}}}}{557383680} + \\
 & \frac{165317 \overline{x \overline{xyy \overline{xyy \overline{yy}}}}}{5573836800} - \frac{167129 \overline{x \overline{xy \overline{xyy \overline{xyy}}}}}{1393459200} + \frac{5771 \overline{xx \overline{xyy \overline{xy \overline{xy}}}}}{1857945600} + \\
 & \frac{x \overline{xyy \overline{yyyyy}}}{230400} + \frac{125249 \overline{xy \overline{xy \overline{xy \overline{xyy}}}}}{696729600} - \frac{\overline{xy \overline{xy \overline{xyy \overline{yy}}}}}{1474560} + \frac{7 \overline{xy \overline{xyy \overline{yyy}}}}{460800} +
 \end{aligned}$$

$$\begin{array}{r}
 \overline{227 \text{ x xy x xy xy y}} \\
 8\ 601\ 600
 \end{array}
 -
 \begin{array}{r}
 \overline{41\ 779 \text{ x xy x xy y yy}} \\
 348\ 364\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{470\ 201 \text{ x xy x xy y xy}} \\
 16\ 721\ 510\ 400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{337 \text{ x x xy xx xy y}} \\
 127\ 401\ 984
 \end{array}
 +
 \begin{array}{r}
 \overline{531\ 487 \text{ xx xy y x xy y}} \\
 33\ 443\ 020\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{55\ 883 \text{ xx xy y y x xy}} \\
 8\ 360\ 755\ 200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{223\ 739 \text{ x xy y x xy y y}} \\
 5\ 573\ 836\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{43\ 339 \text{ x xy xy y y xy}} \\
 154\ 828\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{1685 \text{ x x xy xy x xy}} \\
 445\ 906\ 944
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{6779 \text{ x xy y y xy y y}} \\
 167\ 215\ 104
 \end{array}
 +
 \begin{array}{r}
 \overline{168\ 341 \text{ x xy y yy xy y}} \\
 2\ 786\ 918\ 400
 \end{array}
 +
 \begin{array}{r}
 \overline{34\ 273 \text{ x xy y yy xy}} \\
 1\ 393\ 459\ 200
 \end{array}
 +
 \begin{array}{r}
 \overline{\text{xy y xy y yy}} \\
 51\ 200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{141\ 679 \text{ x xy xy x xy y}} \\
 5\ 573\ 836\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{148\ 361 \text{ x xy y y xy xy}} \\
 928\ 972\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{\text{xy y xy y yy}} \\
 92\ 160
 \end{array}
 -
 \begin{array}{r}
 \overline{8623 \text{ x xy xy xy xy}} \\
 836\ 075\ 520
 \end{array}
 ,$$

$$-
 \begin{array}{r}
 \overline{73 \text{ xxxxxxx xy}} \\
 3\ 503\ 554\ 560
 \end{array}
 +
 \begin{array}{r}
 \overline{73 \text{ xxxxxxx xy}} \\
 875\ 888\ 640
 \end{array}
 -
 \begin{array}{r}
 \overline{1621 \text{ xxxxxxx xy y y}} \\
 6\ 812\ 467\ 200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{511 \text{ xxxxx xy xy}} \\
 2\ 335\ 703\ 040
 \end{array}
 +
 \begin{array}{r}
 \overline{12\ 941 \text{ xxxxx xy y yy}} \\
 30\ 656\ 102\ 400
 \end{array}
 +
 \begin{array}{r}
 \overline{2701 \text{ xxxxx xy y xy}} \\
 2\ 335\ 703\ 040
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{709 \text{ xxxx xy y yy}} \\
 1\ 513\ 881\ 600
 \end{array}
 +
 \begin{array}{r}
 \overline{10\ 658\ 749 \text{ xxx xy xy xy y}} \\
 2\ 207\ 239\ 372\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{309\ 097 \text{ xxx x xy x xy y}} \\
 735\ 746\ 457\ 600
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{73 \text{ xxxx xy x xy}} \\
 350\ 355\ 456
 \end{array}
 -
 \begin{array}{r}
 \overline{493\ 901 \text{ xxxx xy y xy y}} \\
 183\ 936\ 614\ 400
 \end{array}
 -
 \begin{array}{r}
 \overline{2\ 845\ 043 \text{ xxxx xy y y xy}} \\
 735\ 746\ 457\ 600
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{21\ 047 \text{ xxx x xy xy xy}} \\
 49\ 049\ 763\ 840
 \end{array}
 +
 \begin{array}{r}
 \overline{22\ 333 \text{ xxx xy y yyy}} \\
 61\ 312\ 204\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{34\ 151 \text{ xx x xy x xy xy}} \\
 105\ 106\ 636\ 800
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{558\ 079 \text{ xxxx xy y x xy}} \\
 735\ 746\ 457\ 600
 \end{array}
 +
 \begin{array}{r}
 \overline{237\ 203 \text{ xxx xy xy y xy}} \\
 28\ 665\ 446\ 400
 \end{array}
 +
 \begin{array}{r}
 \overline{8501 \text{ xxx xy y y xy y}} \\
 19\ 707\ 494\ 400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{1038523xxxxyyyxy} + \overline{289963xxxxyxyxy} + \overline{5474027xxxxyxyxy} - \\
 441447874560 + 315319910400 + 367873228800
 \end{array}$$

$$\begin{array}{r}
 \overline{59xxxxyyyyy} - \overline{4253849xxxxyxyxy} + \overline{719xxxxyxyxy} + \\
 283852800 - 1103619686400 + 1513881600
 \end{array}$$

$$\begin{array}{r}
 \overline{35129xxxxyxyxy} + \overline{8009xxxxyxyxy} + \overline{32597023xxxxyxyxy} - \\
 51732172800 + 100329062400 + 3310859059200
 \end{array}$$

$$\begin{array}{r}
 \overline{193xxxxyxyxy} - \overline{73xxxxyxyxy} + \overline{4819627xxxxyxyxy} + \\
 1114767360 - 1401421824 + 2207239372800
 \end{array}$$

$$\begin{array}{r}
 \overline{6298057xxxxyxyxy} + \overline{1291483xxxxyxyxy} + \overline{22182553xxxxyxyxy} - \\
 2207239372800 + 551809843200 + 2207239372800
 \end{array}$$

$$\begin{array}{r}
 \overline{125977xxxxyxyxy} - \overline{6169xxxxyxyxy} + \overline{148607xxxxyxyxy} + \\
 73574645760 - 61312204800 + 15328051200
 \end{array}$$

$$\begin{array}{r}
 \overline{2794081xxxxyxyxy} + \overline{227923xxxxyxyxy} - \overline{829699xxxxyxyxy} - \\
 183936614400 + 45984153600 - 245248819200
 \end{array}$$

$$\begin{array}{r}
 \overline{7295737xxxxyxyxy} + \overline{83579xxxxyxyxy} + \overline{6724561xxxxyxyxy} - \\
 1655429529600 + 6270566400 + 2207239372800
 \end{array}$$

$$\begin{array}{r}
 \overline{2725xxxxyxyxy} - \overline{3371371xxxxyxyxy} + \overline{5xxxxyyyyy} - \\
 1839366144 - 735746457600 + 76640256
 \end{array}$$

$$\begin{array}{r}
 \overline{32212661xyxyxyxy} - \overline{7417xyxyxyxy} - \overline{911501xyxyxyxy} + \\
 1103619686400 - 11496038400 - 275904921600
 \end{array}$$

$$\begin{array}{r}
 \overline{8101679xyxyxyxy} - \overline{7407887xxxxyxyxy} + \overline{2063xxxxyxyxy} + \\
 122624409600 - 1103619686400 + 3406233600
 \end{array}$$

$$\begin{array}{r}
 \overline{807709} \overline{xxy} \overline{xy} \overline{xy} \overline{xyy} + \overline{281539} \overline{xxy} \overline{xy} \overline{xyy} \overline{xyy} + \overline{3542501} \overline{xxy} \overline{xy} \overline{xyy} \overline{yxy} \\
 \hline
 472979865600 + 39414988800 + 551809843200 - \\
 \\
 \overline{2704069} \overline{xxy} \overline{xy} \overline{xy} \overline{xyy} - \overline{666053} \overline{xxx} \overline{xy} \overline{xyy} \overline{y} - \overline{269} \overline{xxx} \overline{xy} \overline{xy} \overline{xy} + \\
 \hline
 472979865600 - 2207239372800 - 30656102400 + \\
 \\
 \overline{20761} \overline{xxx} \overline{xyy} \overline{xy} \overline{xy} - \overline{9132941} \overline{xxx} \overline{xyy} \overline{xy} \overline{xy} - \overline{692779} \overline{xxx} \overline{xy} \overline{xyy} \overline{xy} + \\
 \hline
 81749606400 - 2207239372800 - 367873228800 + \\
 \\
 \overline{668743} \overline{xxx} \overline{xyy} \overline{y} \overline{xy} \overline{xyy} + \overline{599749} \overline{xxx} \overline{xyy} \overline{yy} \overline{xy} - \overline{1084147} \overline{xxx} \overline{xyy} \overline{xy} \overline{xyy} \overline{yy} - \\
 \hline
 91968307200 + 441447874560 + 183936614400 - \\
 \\
 \overline{97957} \overline{xxx} \overline{xyy} \overline{xy} \overline{xyy} \overline{y} + \overline{8141893} \overline{xxx} \overline{xyy} \overline{xy} \overline{xyy} \overline{xy} + \overline{7706899} \overline{xxx} \overline{xy} \overline{xyy} \overline{xy} \overline{xyy} - \\
 \hline
 3027763200 + 735746457600 + 2207239372800 - \\
 \\
 \overline{32336137} \overline{xxx} \overline{xy} \overline{xy} \overline{xyy} \overline{xy} + \overline{276559} \overline{xxx} \overline{xy} \overline{xyy} \overline{yy} \overline{xy} - \overline{19649741} \overline{xxx} \overline{xyy} \overline{xy} \overline{xyy} - \\
 \hline
 2207239372800 + 66886041600 - 2207239372800 - \\
 \\
 \overline{673921} \overline{xxx} \overline{xyy} \overline{y} \overline{xy} \overline{xyy} - \overline{3045757} \overline{xxx} \overline{xyy} \overline{xyy} \overline{y} \overline{xy} - \overline{19639} \overline{xxx} \overline{xyy} \overline{yy} \overline{xyy} \overline{y} - \\
 \hline
 11496038400 - 66886041600 - 5109350400 - \\
 \\
 \overline{49387} \overline{xxx} \overline{xyy} \overline{yyy} \overline{xyy} + \overline{91} \overline{xxx} \overline{xyy} \overline{yyyy} \overline{xy} + \overline{5143} \overline{xyy} \overline{xyy} \overline{xyy} \overline{y} - \\
 \hline
 45984153600 + 243302400 + 9853747200 - \\
 \\
 \overline{977} \overline{xyy} \overline{xyy} \overline{yyy} - \overline{66257} \overline{xy} \overline{xyy} \overline{y} \overline{xyy} \overline{y} - \overline{28807} \overline{xy} \overline{xyy} \overline{yy} \overline{xyy} - \\
 \hline
 2554675200 - 19707494400 - 9853747200 - \\
 \\
 \overline{75023} \overline{xxx} \overline{xy} \overline{xy} \overline{xyy} \overline{y} + \overline{5749} \overline{xxx} \overline{xy} \overline{xy} \overline{xy} - \overline{449821} \overline{xxx} \overline{xyy} \overline{xyy} \overline{xyy} - \\
 \hline
 200658124800 + 91968307200 - 10218700800 - \\
 \\
 \overline{4337719} \overline{xxx} \overline{xy} \overline{xyy} \overline{xy} \overline{xy} - \overline{7472963} \overline{xxx} \overline{xyy} \overline{y} \overline{xyy} \overline{xy} - \overline{286939} \overline{xxx} \overline{xyy} \overline{yy} \overline{xy} \overline{xy} - \\
 \hline
 551809843200 - 52553318400 - 10510663680 -
 \end{array}$$

$$\begin{aligned}
 & \left[\frac{659 \overline{\overline{xyyyxyyy}}}{1532805120} - \frac{1839709x \overline{\overline{xyxyxyxy}}}{245248819200} - \frac{\overline{\overline{xyyyyyyyyy}}}{95800320}, \dots \right], \\
 y \rightarrow LS & \left[\frac{\overline{\overline{x}}}{2}, -\frac{\overline{\overline{xy}}}{12}, 0, \frac{\overline{\overline{xxxxy}}}{5760} - \frac{1}{720} \overline{\overline{xyxy}} + \frac{1}{720} \overline{\overline{xyyy}}, -\frac{\overline{\overline{xxxxy}}}{7680} - \frac{19 \overline{\overline{xyxy}}}{69120}, \right. \\
 & - \frac{\overline{\overline{xxxxy}}}{645120} - \frac{17 \overline{\overline{xxxxy}}}{967680} + \frac{\overline{\overline{xyyy}}}{20160} + \frac{439 \overline{\overline{xyxy}}}{2903040} - \frac{599 \overline{\overline{xxxxy}}}{5806080} + \\
 & \frac{x \overline{\overline{xyyy}}}{15120} + \frac{\overline{\overline{xyxy}}}{12096} + \frac{71 \overline{\overline{xyxy}}}{483840} - \frac{\overline{\overline{xyyy}}}{30240}, \frac{\overline{\overline{xxxxy}}}{258048} + \frac{31 \overline{\overline{xxxxy}}}{2903040} + \\
 & \frac{83 \overline{\overline{xxxxy}}}{1548288} + \frac{671 \overline{\overline{xxxxy}}}{7741440} - \frac{31 \overline{\overline{xyyy}}}{967680} - \frac{383 \overline{\overline{xyxy}}}{5806080} - \frac{\overline{\overline{xyxy}}}{30720} + \\
 & \frac{17 \overline{\overline{xyxy}}}{23224320} - \frac{29 \overline{\overline{xxxxy}}}{1548288} + \frac{11 \overline{\overline{xyyy}}}{414720} + \frac{43 \overline{\overline{xyxy}}}{11612160}, \\
 & \frac{\overline{\overline{xxxxxy}}}{77414400} + \frac{2783 \overline{\overline{xxxxxy}}}{464486400} - \frac{383 \overline{\overline{xxxxxy}}}{58060800} + \frac{223 \overline{\overline{xxxxy}}}{4180377600} - \\
 & \frac{3281 \overline{\overline{xxxxy}}}{232243200} - \frac{737 \overline{\overline{xxxxy}}}{33177600} + \frac{8009 \overline{\overline{xxxxy}}}{232243200} + \frac{73 \overline{\overline{xyyy}}}{14515200} + \\
 & \frac{793 \overline{\overline{xyyy}}}{29030400} + \frac{289 \overline{\overline{xxxxy}}}{8164800} - \frac{4679 \overline{\overline{xxxxy}}}{696729600} - \\
 & \frac{4217 \overline{\overline{xxxxy}}}{116121600} + \frac{739 \overline{\overline{xxxxy}}}{99532800} + \frac{4751 \overline{\overline{xyyy}}}{174182400} - \frac{407 \overline{\overline{xxxxy}}}{92897280} - \\
 & \frac{x \overline{\overline{xyyy}}}{403200} - \frac{\overline{\overline{xyyy}}}{172800} + \frac{47 \overline{\overline{xxxxy}}}{6451200} + \frac{1009 \overline{\overline{xxxxy}}}{597196800} + \\
 & \frac{2701 \overline{\overline{xxxxy}}}{464486400} + \frac{11929 \overline{\overline{xxxxy}}}{696729600} - \frac{\overline{\overline{xyyy}}}{92160} - \frac{151 \overline{\overline{xyyy}}}{14515200} -
 \end{aligned}$$

$$\begin{aligned}
 &\frac{57377 \times x \times xy \ y \ x \ xy}{928972800} + \frac{48049 \times xy \ y \ x \ xy \ y \ y}{16721510400} - \frac{31249 \times xy \ y \ xy \ xy \ y}{1857945600} + \\
 &\frac{2039 \times xy \ xy \ y \ xy}{149299200} + \frac{7087 \times x \ xy \ xy \ x \ xy}{928972800} + \frac{11 \times xy \ y \ xy \ y \ y}{6220800} - \\
 &\frac{x \ xy \ y \ yy \ xy \ y}{184320} + \frac{547 \times xy \ y \ yyy \ xy}{174182400} - \frac{xy \ xy \ y \ xy \ y}{184320} + \frac{3767 \times xy \ xy \ x \ xy \ y}{265420800} - \\
 &\frac{53 \times xy \ y \ xy \ y \ xy}{23224320} + \frac{165317 \times xy \ y \ xy \ xy \ xy}{8360755200} - \frac{102293 \times xy \ xy \ xy \ xy \ y}{16721510400}, \\
 &\frac{xxxxxxx \ x \ xy}{9809952768} + \frac{108481 \times xxxxxxx \ xy \ y}{490497638400} - \frac{3576583 \times xxxxxx \ xy \ y \ y}{1471492915200} - \\
 &\frac{193559 \times xxxxx \ xy \ xy \ y}{45984153600} - \frac{573893 \times xxxxx \ x \ xy \ xy}{980995276800} + \frac{2963351 \times xxxxx \ xy \ y \ yy}{1471492915200} + \\
 &\frac{5074979 \times xxx \ xy \ xy \ y \ y}{105106636800} + \frac{148157 \times xxxxx \ xy \ y \ xy}{33443020800} - \frac{24281819 \times xxx \ xy \ y \ yy \ y}{735746457600} + \\
 &\frac{425549 \times xxx \ xy \ xy \ xy \ y}{15328051200} - \frac{220416211 \times xxx \ xy \ xy \ y \ yy}{2207239372800} + \frac{62435 \times xxx \ x \ xy \ x \ xy \ y}{8408530944} + \\
 &\frac{9145 \times xxx \ x \ xy \ x \ xy}{29429858304} - \frac{2059273 \times xxx \ xy \ y \ xy \ y}{183936614400} - \frac{19210427 \times xxx \ xy \ y \ y \ xy}{441447874560} - \\
 &\frac{58195217 \times xxx \ xy \ y \ xy \ y \ y}{1103619686400} - \frac{1352893 \times xxx \ x \ xy \ xy \ xy}{1103619686400} + \frac{198703 \times xxx \ xy \ y \ yyy \ y}{73574645760} - \\
 &\frac{1880881 \times x \ xy \ xy \ xy \ y \ y}{11496038400} - \frac{151 \times x \ xy \ xy \ y \ yy \ y}{123863040} - \frac{402743 \times x \ x \ xy \ x \ xy \ y \ y}{20065812480} -
 \end{aligned}$$

$\frac{238\,993 \times x \times xy \times xy \times y}{472\,979\,865\,600}$	+	$\frac{8\,829\,419 \times xxx \times xy \times xy}{4\,414\,478\,745\,600}$	-	$\frac{12\,003\,391 \times xxx \times xy \times xy \times y}{315\,319\,910\,400}$	+
$\frac{6\,801\,001 \times xxx \times xy \times y \times xy}{73\,574\,645\,760}$	+	$\frac{635\,731 \times xxx \times xy \times yy \times xy}{4\,087\,480\,320}$	-	$\frac{1\,915\,247 \times x \times xy \times xy \times yy}{122\,624\,409\,600}$	+
$\frac{20\,652\,439 \times x \times xy \times xy \times xy}{367\,873\,228\,800}$	+	$\frac{45\,985 \times xxx \times xy \times xy \times xy}{5\,518\,098\,432}$	-	$\frac{3\,071 \times x \times xy \times yy \times yy}{1\,277\,337\,600}$	-
$\frac{14\,855\,587 \times xy \times xy \times xy \times xy}{147\,149\,291\,520}$	+	$\frac{337\,979 \times xy \times xy \times xy \times yy}{30\,656\,102\,400}$	-	$\frac{240\,773 \times xy \times xy \times xy \times y}{275\,904\,921\,600}$	-
$\frac{2\,353 \times xy \times xy \times yy \times yy}{319\,334\,400}$	+	$\frac{512\,533 \times x \times xy \times xy \times xy}{157\,659\,955\,200}$	+	$\frac{5496\,541 \times x \times xy \times xy \times yy}{88\,289\,574\,912}$	+
$\frac{4\,510\,963 \times x \times xy \times xy \times xy \times xy}{220\,723\,937\,280}$	-	$\frac{143\,057 \times x \times xy \times xy \times xy}{220\,723\,937\,280}$	+	$\frac{3\,793 \times xxx \times xy \times xy \times xy}{65\,399\,685\,120}$	+
$\frac{3\,588\,943 \times xxx \times xy \times xy \times xy}{1\,103\,619\,686\,400}$	-	$\frac{955\,537 \times xxx \times xy \times y \times xy}{100\,329\,062\,400}$	-	$\frac{29\,528\,801 \times x \times xy \times xy \times xy}{2\,207\,239\,372\,800}$	-
$\frac{31\,976\,627 \times x \times xy \times xy \times xy \times xy}{735\,746\,457\,600}$	+	$\frac{2\,000\,917 \times x \times xy \times xy \times y \times xy}{13\,377\,208\,320}$	+	$\frac{6\,678\,601 \times x \times xy \times xy \times xy \times xy}{1\,103\,619\,686\,400}$	-
$\frac{672\,319 \times x \times xy \times y \times xy \times y}{22\,992\,076\,800}$	-	$\frac{104\,161 \times x \times xy \times yy \times xy \times y}{2\,388\,787\,200}$	-	$\frac{170\,477 \times x \times xy \times yy \times xy \times y}{11\,496\,038\,400}$	-
$\frac{39\,869 \times xy \times xy \times yy \times yy}{5\,748\,019\,200}$	-	$\frac{3\,939\,329 \times xy \times xy \times y \times xy \times y}{137\,952\,460\,800}$	+	$\frac{6\,049\,117 \times x \times xy \times xy \times xy \times y}{441\,447\,874\,560}$	-
$\frac{239\,159 \times x \times xy \times xy \times xy \times xy}{5\,109\,350\,400}$	-	$\frac{34\,038\,307 \times x \times xy \times y \times xy \times xy}{367\,873\,228\,800}$	-	$\frac{62\,021 \times xy \times y \times xy \times yy \times yy}{22\,992\,076\,800}$	+

$$\begin{array}{r}
 \overline{5475931} \times \overline{2207239372800} + \overline{11975040} \times \overline{204053} \overline{22992076800} - \\
 \overline{1273} \overline{3832012800} + \overline{139} \overline{74649600} - \overline{1591039} \overline{275904921600} + \\
 \overline{3548160} \times \overline{8695} \overline{22072393728} - \overline{611} \overline{851558400} - \\
 \overline{1421713} \overline{735746457600} + \overline{138739} \overline{183936614400} + \overline{637943} \overline{137952460800} + \\
 \overline{4553} \overline{7357464576} + \overline{2113} \overline{8758886400} + \overline{9929} \overline{10032906240} + \\
 \overline{25457} \overline{91968307200} + \overline{1424623} \overline{1103619686400} - \overline{27829} \overline{13138329600} - \\
 \overline{22999} \overline{61312204800} - \overline{4409} \overline{7664025600} - \overline{821} \overline{1916006400} - \\
 \overline{617} \overline{2554675200} - \overline{353621} \overline{91968307200} - \overline{3551} \overline{2919628800} + \\
 \overline{244967} \overline{22992076800} - \overline{29197} \overline{13138329600} + \overline{3599} \overline{13138329600} + \\
 \overline{1291} \overline{1094860800} + \overline{35153} \overline{30656102400} + \overline{389} \overline{383201280} + \\
 \overline{541} \overline{638668800} + \overline{767} \overline{1277337600} - \overline{10013} \overline{7664025600} +
 \end{array}$$

$$\begin{aligned}
 & \frac{\overline{\overline{\overline{\overline{xy\ y\ xy\ y\ yyy}}}}}}{1995840} + \frac{\overline{\overline{\overline{\overline{1669\ xy\ xy\ y\ xy\ y\ y}}}}}}{1532805120} + \frac{\overline{\overline{\overline{\overline{1339\ xy\ xy\ y\ y\ xy\ y}}}}}}{547430400} + \\
 & \frac{\overline{\overline{\overline{\overline{85559\ x\ xy\ xy\ x\ xy\ y\ y}}}}}}{551809843200} - \frac{\overline{\overline{\overline{\overline{717553\ x\ x\ xy\ x\ xy\ x\ xy}}}}}}{945959731200} + \frac{\overline{\overline{\overline{\overline{175303\ x\ xy\ y\ xy\ y\ xy\ y}}}}}}{137952460800} + \\
 & \frac{\overline{\overline{\overline{\overline{4801217\ x\ xy\ xy\ y\ xy\ xy}}}}}}{2207239372800} + \frac{\overline{\overline{\overline{\overline{175081\ x\ xy\ y\ y\ xy\ y\ xy}}}}}}{18393661440} + \frac{\overline{\overline{\overline{\overline{10657\ x\ xy\ y\ yy\ xy\ xy}}}}}}{3406233600} + \\
 & \left. \left[\frac{\overline{\overline{\overline{\overline{xy\ y\ y\ xy\ y\ yyy}}}}}}{2280960} - \frac{\overline{\overline{\overline{\overline{336583\ x\ xy\ y\ xy\ xy\ xy}}}}}}{22992076800} - \frac{\overline{\overline{\overline{\overline{xy\ y\ y\ y\ y\ y\ y\ y}}}}}}{47900160}, \dots \right] \right\},
 \end{aligned}$$

CWS [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...] }