
```

<< FreeLie.m;
<< AwCalculus.m;
$SeriesShowDegree = 3;

FreeLie` implements / extends
{*, +, **, $SeriesShowDegree, <>, ∫, ≡, ad, Ad, adSeries, AllCyclicWords,
  AllLyndonWords, AllWords, ASeries, AW, b, BCH, BooleanSequence, BracketForm, BS,
  CC, Crop, CW, CWS, CWSeries, D, Deg, DegreeScale, DerivationSeries, div, EulerE,
  Exp, InvertLieMorphism, j, J, JA, LieDerivation, LieMorphism, LieSeries, LS, LW,
  LyndonFactorization, New, RandomCWSeries, Randomizer, RandomLieSeries, RC, SeriesSolve,
  Support, tb, TopBracketForm, tr, UndeterminedCoefficients, Γ, ℓ, Δ, ħ, ⇐, ⇐}.

AwCalculus` implements / extends
{*, **, E, ≡, dA, deg, dm, dS, dΔ, dη, dσ, E1, Es, hA, hm, hS, hσ, tA, tha, tm, tS, tσ, Γ, Δ}.

R+[a_, b_] // ζt:(1|s) := Et[<a → LS[0], b → LS[LW@a]>, CWS[0]];
R-[a_, b_] // ζt:(1|s) := Et[<a → LS[0], b → -LS[LW@a]>, CWS[0]];
ζt:(1|s)[K1_ ** K2_] := ζt[K1] ** ζt[K2];
ζt:(1|s)[K1_ K2_] := ζt[K1] ζt[K2];

SeriesSolve[{
  α = LS[{"1", "2"}, αs], β = LS[{"1", "2"}, βs],
  γ = CWS[{"1", "2"}, γs], κ = CWS[{"1"}, κs]
},
V = Es[<1 → α, 2 → β>, γ]; Cap = Es[<1 → LS[0]>, κ];
ħ-1 (ζs[R+[2, 3] ** R+[1, 3]] ** V ≡ V ** (ζs[R+[1, 3]] // dΔ[1, 1, 2]))
&& V ** (V // dA[1] // dA[2]) ≡ Es[<1 → LS[0], 2 → LS[0]>, CWS[0]]
&& (V ** (Cap // dΔ[1, 1, 2]) // dc[1] // dc[2]) ≡
  (Cap (Cap // dσ[1, 2]) // dc[1] // dc[2])
]

κ@{11} // Timing
Arbitrator called on {αs[2], κs[1]}...
Arbitrator called on {αs[122]}...
Arbitrator called on {αs[11122]}...
Arbitrator called on {αs[1111122]}...
Arbitrator called on {αs[11112122]}...
Arbitrator called on {αs[111111122]}...
Arbitrator called on {αs[1111112122]}...
Arbitrator called on {αs[1111111122], αs[11111121222]}...
{4424.682347,
  CWS[0, - $\frac{11}{96}$ , 0,  $\frac{1111}{11520}$ , 0, - $\frac{111111}{725760}$ , 0,  $\frac{11111111}{38707200}$ , 0, - $\frac{1111111111}{1916006400}$ , 0, ...]}

```

? Save

Save["filename", symbol] appends definitions associated with the specified symbol to a file.

Save["filename", "form"] appends definitions associated with all symbols whose names match the string pattern "form".

Save["filename", "context"] appends definitions associated with all symbols in the specified context.

Save["filename", {object₁, object₂, ...}] appends definitions associated with several objects. >>

Save["V-11.m", {αs, βs, γs, κs}]

κ@{12} // Timing

Arbitrator called on {αs[11111112122], αs[11111212222]}...

$$\left\{ 16572.718564, \text{CWS}\left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0, -\frac{\overline{11111}}{725760}, 0, \frac{\overline{1111111}}{38707200}, 0, -\frac{\overline{111111111}}{1916006400}, 0, \frac{691 \overline{11111111111}}{62768369664000}, \dots\right] \right\}$$

Save["V-12.m", {αs, βs, γs, κs}]