Pensieve header: Tracing NOE-1 using vcw conventions

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2016-11"];
Once[<< KnotTheory`]
```

```
Loading KnotTheory` version of September 6, 2014, 13:37:37.2841.
Read more at http://katlas.org/wiki/KnotTheory.
```

NOE-1 Programs

$$\Lambda[k\_] := -\frac{\lambda\left(1+t_k\right)}{4}\left(4 v_k c_k w_k \delta^2 \mu^2+\delta\left(1+\mu\right)\left(w_k^2 \alpha^2+v_k^2 \beta^2\right)+v_k^2 w_k^2 \delta^3\left(1+3\mu\right)+\left(1-t_k\right)\left(2\left(\alpha\beta+\delta\mu\right)^2-\alpha^2\beta^2\right)+2\left(\alpha\beta+2\delta\mu+v_k w_k \delta^2\left(1+2\mu\right)+2 c_k \delta\mu^2\right)\left(w_k \alpha+v_k \beta\right)+4\left(c_k \mu^2+v_k w_k \delta\left(1+\mu\right)\right)\left(\alpha\beta+\delta\mu\right)\right);$$

```
DP_{x_→D_α_, y_→D_β_}[P_][f_] := (* means P[∂_α,∂_β][f] *)
  Total[CoefficientRules[P, {x, y}] /. ({m_, n_} → c_) :→ c D[f, {α, m}, {β, n}]]
```

```
CF[𝔼[ω_, L_, Q_, P_]] := Expand /@ Together /@
    𝔼[ω /. b_l_ :→ Log[t_l], L, Q /. b_l_ :→ Log[t_l], P /. b_l_ :→ Log[t_l]];
𝔼 /: 𝔼[ω1_, L1_, Q1_, P1_] 𝔼[ω2_, L2_, Q2_, P2_] := CF@𝔼[ω1 ω2, L1 + L2, ω2 Q1 + ω1 Q2, ω2^4 P1 + ω1^4 P2];
𝔼 /: 𝔼[ω1_, L1_, Q1_, P1_] ≡ 𝔼[ω2_, L2_, Q2_, P2_] := (ω1 == ω2 ∧ L1 == L2 ∧ Q1 == Q2 ∧ P1 == P2);
```

```
N_{c_j_ (x:v|w)_i_ → k_}[𝔼[ω_, L_, Q_, P_]] := With[{q = ⅇ^γ β x_k + γ c_k}, CF[
    𝔼[ω, γ c_k + (L /. c_j → 0), ω ⅇ^γ β x_k + (Q /. x_i → 0), ⅇ^{-q} DP_{c_j→D_γ, x_i→D_β}[P][ⅇ^q]] /. {γ → ∂_{c_j} L, β → ω^{-1} ∂_{x_i} Q}]];
```

```
N_{w_i_ v_j_ → k_}[𝔼[ω_, L_, Q_, P_]] := With[{q = ((1 - t_k) α β + β v_k + δ v_k w_k + α w_k) / μ}, CF[
    𝔼[μ ω, L, μ ω q + μ (Q /. w_i | v_j → 0), μ^4 ⅇ^{-q} DP_{w_i→D_α, v_j→D_β}[P][ⅇ^q] + ω^4 Λ[k]] /. μ → 1 + (t_k - 1) δ /.
     {α → ω^{-1} (∂_{w_i} Q /. v_j → 0), β → ω^{-1} (∂_{v_j} Q /. w_i → 0), δ → ω^{-1} ∂_{w_i,v_j} Q}]];
```

```
m_{i_,j_→k_}[Z_] := Module[{x, z},
   Z // N_{w_i v_j→x} // N_{c_i v_x→x} // N_{w_x c_j→x} // ReplaceAll[z_{i|j|x} → z_k] // CF]
```

```
R^+_{i_,j_} := 𝔼[1, b_i c_j, v_i w_j, v_i c_i w_j + c_i c_j + v_i^2 w_j^2 / 4];
R^-_{i_,j_} := 𝔼[1, -b_i c_j, -t_i^{-1} v_i w_j, -c_i c_j + t_i^{-1} v_i c_j w_j - t_i^{-2} v_i^2 w_j^2 / 4];
ur_i_ := 𝔼[t_i^{-1/2}, 0, 0, c_i t_i^{-2}]; nr_i_ := 𝔼[t_i^{1/2}, 0, 0, -c_i t_i^2];
ul_ = nl_ = 𝔼[1, 0, 0, 0];
```

Computing trZ_I

```
RVK::usage =
  "RVK[xs, rots] represents a Rotational Virtual Knot with a list of n Xp/Xm crossings xs and
    a length 2n list of rotation numbers rots. Crossing sites are indexed 1 through
    2n, and rots⟦k⟧ is the rotation between site k-1 and site k. RVK is also a casting
    operator converting to the RVK presentation from other knot presentations.";
RVK[pd_PD] := Module[{n, xs, x, rots, front, k},
   n = Length[pd];
   xs = List @@ pd /. x_X :→ If[PositiveQ[x], Xp[x⟦4⟧, x⟦1⟧], Xm[x⟦2⟧, x⟦1⟧]];
   rots = Table[0, {2 n}];
   front = {0};
   For[k = 0, k < 2 n, ++k,
    If[k == 0 ∨ FreeQ[front, -k],
     front = Flatten[front /. k → Catch[xs /. {
             Xp[k + 1, l_] | Xm[l_, k + 1] :→ Throw[{l, k + 1, 1 - l}],
             Xp[l_, k + 1] | Xm[k + 1, l_] :→ (++rots⟦l⟧; Throw[{1 - l, k + 1, l}])
           }]],
     If[MatchQ[front, {___, k, ___, -k, ___}], --rots⟦k + 1⟧]
    ]
   ];
   RVK[xs, rots]
  ];
RVK[K_] := RVK[PD[K]];
```

```
rot[_, 0] = 𝔼[1, 0, 0, 0];
rot[i_, 1] := ur_i;
rot[i_, n_Integer] /; n > 1 := Module[{y}, rot[i, n - 1] rot[y, 1] // m_{i,y→i}];
rot[i_, -1] := nr_i;
rot[i_, n_Integer] /; n < -1 := Module[{y}, rot[i, n + 1] rot[y, -1] // m_{i,y→i}];
```

```
{rot[i, 2], rot[i, -2]}
```

$$\left\{\mathbb{E}\left[\frac{1}{t_i}, 0, 0, \frac{2\,c_i}{t_i^4}\right], \mathbb{E}\left[t_i, 0, 0, -2\,c_i\,t_i^4\right]\right\}$$

```
trZ[K_] := trZ[RVK@K];
trZ[rvk_RVK] := Module[{tr, todo, n, rots, ζ, done, st, x, ζ1, i, j, k, k1, k2, k3},
  {todo, rots} = List @@ rvk;
  AppendTo[rots, 0];
  n = Length[todo];
  tr = {ζ = 𝔼[1, 0, 0, 0]};
  done = {0};
  st = Range[0, 2 n + 1];
  While[todo =!= {},
   {x} = MaximalBy[todo, Length[done ⋂ {#[[1]], #[[2]], #[[1]] - 1, #[[2]] - 1}] &, 1];
   Z$todo = todo; Z$x = x;
   {i, j} = List @@ x;
   ζ1 = Switch[Head[x],
     Xp, m_{j,k→j}[R^+_{i,j} (R^-_{k3,k} nr_{k1} ul_{k2} // m_{k,k1→k} // m_{k,k2→k} // m_{k,k3→k})],
     Xm, m_{j,k→j}[R^-_{i,j} (R^+_{k,k3} nr_{k1} ul_{k2} // m_{k,k1→k} // m_{k,k2→k} // m_{k,k3→k})]
    ];
   ζ1 = rot[k, rots[[i]]] ζ1 // m_{k,i→i}; rots[[i]] = 0;
   ζ1 = ζ1 rot[k, rots[[i + 1]]] // m_{i,k→i}; rots[[i + 1]] = 0;
   ζ1 = rot[k, rots[[j]]] ζ1 // m_{k,j→j}; rots[[j]] = 0;
   ζ1 = ζ1 rot[k, rots[[j + 1]]] // m_{j,k→j}; rots[[j + 1]] = 0;
   ζ *= ζ1;
   If[MemberQ[done, i], ζ = ζ // m_{i,i+1→i}; st = st /. st[[i + 2]] → st[[i + 1]]];
   If[MemberQ[done, i - 1], ζ = ζ // m_{st[[i]],i→st[[i]]}; st = st /. st[[i + 1]] → st[[i]]];
   If[MemberQ[done, j], ζ = ζ // m_{j,j+1→j}; st = st /. st[[j + 2]] → st[[j + 1]]];
   If[MemberQ[done, j - 1], ζ = ζ // m_{st[[j]],j→st[[j]]}; st = st /. st[[j + 1]] → st[[j]]];
   done = done ⋃ {i - 1, i, j - 1, j};
   todo = DeleteCases[todo, x];
   AppendTo[tr, ζ];
  ];
  tr
 ]
```

Some Traces

```
t_ = t; trZ[Knot[3, 1]]
```

KnotTheory: Loading precomputed data in PD4Knots`.

$$\{\mathbb{E}[1, 0, 0, 0], \mathbb{E}\Big[t, b_0 c_0 - b_4 c_0, v_0 w_0 - v_4 w_0, -t^4 c_0 + t^4 c_0^2 - t^4 c_4 - t^4 c_0 c_4 + t^3 c_0 v_0 w_0 -$$
$$t^3 c_4 v_0 w_0 + t^3 v_4 w_0 - t^4 c_0 v_4 w_0 + t^3 \lambda c_0 v_4 w_0 + t^4 \lambda c_0 v_4 w_0 + \frac{1}{4} t^2 v_0^2 w_0^2 + \frac{1}{2} t^2 v_0 v_4 w_0^2 - \frac{1}{2} t^3 v_0 v_4 w_0^2 +$$
$$\frac{1}{2} t^2 \lambda v_0 v_4 w_0^2 + \frac{1}{2} t^3 \lambda v_0 v_4 w_0^2 + \frac{1}{2} t^3 v_4^2 w_0^2 + \frac{1}{4} t^4 v_4^2 w_0^2 - \frac{1}{4} t^2 \lambda v_4^2 w_0^2 - \frac{1}{2} t^3 \lambda v_4^2 w_0^2 - \frac{1}{4} t^4 \lambda v_4^2 w_0^2\Big],$$
$$\mathbb{E}\Big[t^{3/2}, b_0 c_0 - b_4 c_0 - b_0 c_4 + b_4 c_4, \sqrt{t}\, v_0 w_0 - \sqrt{t}\, v_4 w_0 - \frac{v_0 w_4}{\sqrt{t}} + \frac{v_4 w_4}{\sqrt{t}},$$
$$-t^6 c_0 + t^6 c_0^2 - 2 t^6 c_4 - 2 t^6 c_0 c_4 + t^6 c_4^2 + t^5 c_0 v_0 w_0 - 2 t^5 c_4 v_0 w_0 + t^5 v_4 w_0 - t^6 c_0 v_4 w_0 + t^5 \lambda c_0 v_4 w_0 + t^6 \lambda c_0 v_4 w_0 +$$
$$t^5 c_4 v_4 w_0 + \frac{1}{4} t^4 v_0^2 w_0^2 + \frac{1}{2} t^4 v_0 v_4 w_0^2 - \frac{1}{2} t^5 v_0 v_4 w_0^2 + \frac{1}{2} t^4 \lambda v_0 v_4 w_0^2 + \frac{1}{2} t^5 \lambda v_0 v_4 w_0^2 + \frac{1}{2} t^5 v_4^2 w_0^2 + \frac{1}{4} t^6 v_4^2 w_0^2 -$$
$$\frac{1}{4} t^4 \lambda v_4^2 w_0^2 - \frac{1}{2} t^5 \lambda v_4^2 w_0^2 - \frac{1}{4} t^6 \lambda v_4^2 w_0^2 - t^4 c_0 v_0 w_4 - t^5 c_0 v_0 w_4 + t^4 \lambda c_0 v_0 w_4 + t^5 \lambda c_0 v_0 w_4 + t^4 c_4 v_0 w_4 -$$
$$t^5 c_4 v_0 w_4 + t^4 \lambda c_4 v_0 w_4 + t^5 \lambda c_4 v_0 w_4 - t^4 v_4 w_4 - t^5 c_0 v_4 w_4 - t^6 c_0 v_4 w_4 - 2 t^4 \lambda c_0 v_4 w_4 - t^5 \lambda c_0 v_4 w_4 + t^6 \lambda c_0 v_4 w_4 +$$
$$2 t^5 c_4 v_4 w_4 - t^6 c_4 v_4 w_4 - t^4 \lambda c_4 v_4 w_4 + t^6 \lambda c_4 v_4 w_4 - \frac{1}{2} t^3 v_0^2 w_0 w_4 - \frac{1}{2} t^4 v_0^2 w_0 w_4 + \frac{1}{2} t^3 \lambda v_0^2 w_0 w_4 + \frac{1}{2} t^4 \lambda v_0^2 w_0 w_4 -$$
$$t^3 v_0 v_4 w_0 w_4 - 2 t^3 \lambda v_0 v_4 w_0 w_4 - 2 t^4 \lambda v_0 v_4 w_0 w_4 + \frac{1}{2} t^5 v_4^2 w_0 w_4 + \frac{1}{2} t^6 v_4^2 w_0 w_4 + t^3 \lambda v_4^2 w_0 w_4 + t^4 \lambda v_4^2 w_0 w_4 -$$
$$\frac{1}{2} t^5 \lambda v_4^2 w_0 w_4 - \frac{1}{2} t^6 \lambda v_4^2 w_0 w_4 + \frac{1}{4} t^2 v_0^2 w_4^2 + t^3 v_0^2 w_4^2 + \frac{1}{2} t^4 v_0^2 w_4^2 - \frac{1}{2} t^2 \lambda v_0^2 w_4^2 - t^3 \lambda v_0^2 w_4^2 - \frac{1}{2} t^4 \lambda v_0^2 w_4^2 +$$
$$\frac{1}{2} t^2 v_0 v_4 w_4^2 - t^3 v_0 v_4 w_4^2 + \frac{1}{2} t^4 v_0 v_4 w_4^2 + t^5 v_0 v_4 w_4^2 + \frac{3}{2} t^2 \lambda v_0 v_4 w_4^2 + 2 t^3 \lambda v_0 v_4 w_4^2 - \frac{1}{2} t^4 \lambda v_0 v_4 w_4^2 - t^5 \lambda v_0 v_4 w_4^2 +$$
$$\frac{1}{2} t^3 v_4^2 w_4^2 - \frac{1}{4} t^4 v_4^2 w_4^2 - \frac{1}{2} t^5 v_4^2 w_4^2 + \frac{1}{2} t^6 v_4^2 w_4^2 - \frac{3}{4} t^2 \lambda v_4^2 w_4^2 - \frac{1}{2} t^3 \lambda v_4^2 w_4^2 + \frac{5}{4} t^4 \lambda v_4^2 w_4^2 + \frac{1}{2} t^5 \lambda v_4^2 w_4^2 - \frac{1}{2} t^6 \lambda v_4^2 w_4^2\Big],$$
$$\mathbb{E}\Big[-1 + \frac{1}{t} + t, 0, 0, -8 + \frac{1}{t^4} - \frac{3}{t^3} + \frac{11}{2 t^2} - \frac{3}{t} + 24 t - \frac{67 t^2}{2} + 27 t^3 - \frac{21 t^4}{2} - 4 t^5 + 8 t^6 - 5 t^7 + \frac{3 t^8}{2} - 8 \lambda - \frac{3 \lambda}{t^4} +$$
$$\frac{10 \lambda}{t^3} - \frac{39 \lambda}{2 t^2} + \frac{21 \lambda}{t} - 14 t \lambda + \frac{59 t^2 \lambda}{2} - 26 t^3 \lambda + \frac{21 t^4 \lambda}{2} + 4 t^5 \lambda - 8 t^6 \lambda + 5 t^7 \lambda - \frac{3 t^8 \lambda}{2} - 33 c_0 - \frac{4 c_0}{t^4} + \frac{15 c_0}{t^3} -$$
$$\frac{34 c_0}{t^2} + \frac{44 c_0}{t} - 2 t c_0 + 34 t^2 c_0 - 45 t^3 c_0 + 32 t^4 c_0 - 14 t^5 c_0 + 3 t^6 c_0 + 33 \lambda c_0 + \frac{6 \lambda c_0}{t^4} - \frac{21 \lambda c_0}{t^3} + \frac{44 \lambda c_0}{t^2} -$$
$$\frac{52 \lambda c_0}{t} + 10 t \lambda c_0 - 44 t^2 \lambda c_0 + 51 t^3 \lambda c_0 - 34 t^4 \lambda c_0 + 14 t^5 \lambda c_0 - 3 t^6 \lambda c_0 + 17 v_0 w_0 + \frac{4 v_0 w_0}{t^4} - \frac{15 v_0 w_0}{t^3} +$$
$$\frac{31 v_0 w_0}{t^2} - \frac{36 v_0 w_0}{t} + 17 t v_0 w_0 - 42 t^2 v_0 w_0 + 37 t^3 v_0 w_0 - 17 t^4 v_0 w_0 - 2 t^5 v_0 w_0 + 5 t^6 v_0 w_0 - 3 t^7 v_0 w_0 - 15 \lambda v_0 w_0 -$$
$$\frac{6 \lambda v_0 w_0}{t^4} + \frac{19 \lambda v_0 w_0}{t^3} - \frac{37 \lambda v_0 w_0}{t^2} + \frac{38 \lambda v_0 w_0}{t} - 23 t \lambda v_0 w_0 + 46 t^2 \lambda v_0 w_0 - 39 t^3 \lambda v_0 w_0 + 17 t^4 \lambda v_0 w_0 +$$
$$2 t^5 \lambda v_0 w_0 - 5 t^6 \lambda v_0 w_0 + 3 t^7 \lambda v_0 w_0 - 9 c_0 v_0 w_0 - \frac{3 c_0 v_0 w_0}{t^4} + \frac{9 c_0 v_0 w_0}{t^3} - \frac{18 c_0 v_0 w_0}{t^2} + \frac{18 c_0 v_0 w_0}{t} - 9 t c_0 v_0 w_0 +$$
$$18 t^2 c_0 v_0 w_0 - 18 t^3 c_0 v_0 w_0 + 9 t^4 c_0 v_0 w_0 - 3 t^5 c_0 v_0 w_0 + 9 \lambda c_0 v_0 w_0 + \frac{3 \lambda c_0 v_0 w_0}{t^4} - \frac{9 \lambda c_0 v_0 w_0}{t^3} + \frac{18 \lambda c_0 v_0 w_0}{t^2} -$$
$$\frac{18 \lambda c_0 v_0 w_0}{t} + 9 t \lambda c_0 v_0 w_0 - 18 t^2 \lambda c_0 v_0 w_0 + 18 t^3 \lambda c_0 v_0 w_0 - 9 t^4 \lambda c_0 v_0 w_0 + 3 t^5 \lambda c_0 v_0 w_0 + \frac{9}{4} v_0^2 w_0^2 +$$
$$\frac{9 v_0^2 w_0^2}{4 t^4} - \frac{6 v_0^2 w_0^2}{t^3} + \frac{45 v_0^2 w_0^2}{4 t^2} - \frac{9 v_0^2 w_0^2}{t} + 9 t v_0^2 w_0^2 - \frac{45}{4} t^2 v_0^2 w_0^2 + 9 t^3 v_0^2 w_0^2 - \frac{9}{4} t^4 v_0^2 w_0^2 + \frac{3}{4} t^6 v_0^2 w_0^2 - \frac{9}{4} \lambda v_0^2 w_0^2 -$$
$$\frac{9 \lambda v_0^2 w_0^2}{4 t^4} + \frac{6 \lambda v_0^2 w_0^2}{t^3} - \frac{45 \lambda v_0^2 w_0^2}{4 t^2} + \frac{9 \lambda v_0^2 w_0^2}{t} - 9 t \lambda v_0^2 w_0^2 + \frac{45}{4} t^2 \lambda v_0^2 w_0^2 - 9 t^3 \lambda v_0^2 w_0^2 + \frac{9}{4} t^4 \lambda v_0^2 w_0^2 - \frac{3}{4} t^6 \lambda v_0^2 w_0^2\Big]\}$$

```
t_ = t;
tr = trZ[Knot[10, 160]]
```

$$\{\mathbb{E}[1, 0, 0, 0], \cdots 9 \cdots,$$
$$\mathbb{E}\Big[3 - \frac{1}{t^3} + \frac{4}{t^2} - \frac{4}{t} - 4 t + 4 t^2 - t^3, 0, 0, \frac{77711}{2} - \frac{5}{2 t^{12}} + \frac{26}{t^{11}} - \frac{76}{t^{10}} - \frac{160}{t^9} + \frac{1801}{t^8} - \frac{6356}{t^7} + \frac{14373}{t^6} - \frac{25252}{t^5} + \frac{75153}{2 t^4} -$$
$$\frac{48192}{t^3} + \frac{53022}{t^2} - \frac{49889}{t} - 22035 t + \frac{8643 t^2}{2} + \cdots 365 \cdots + \frac{2064 \lambda v_0^2 w_0^2}{t} - 1958 t \lambda v_0^2 w_0^2 + \frac{6509}{2} t^2 \lambda v_0^2 w_0^2 -$$
$$3792 t^3 \lambda v_0^2 w_0^2 + 4128 t^4 \lambda v_0^2 w_0^2 - 3824 t^5 \lambda v_0^2 w_0^2 + 2769 t^6 \lambda v_0^2 w_0^2 - 1740 t^7 \lambda v_0^2 w_0^2 + 1059 t^8 \lambda v_0^2 w_0^2 -$$
$$510 t^9 \lambda v_0^2 w_0^2 + 112 t^{10} \lambda v_0^2 w_0^2 + 30 t^{11} \lambda v_0^2 w_0^2 - \frac{51}{2} t^{12} \lambda v_0^2 w_0^2 + 6 t^{13} \lambda v_0^2 w_0^2 - \frac{1}{2} t^{14} \lambda v_0^2 w_0^2\Big]\}$$

large output | show less | show more | show all | set size limit...

```
tr⟦1 ;; 3⟧
```

$$\Big\{\mathbb{E}[1,0,0,0],\ \mathbb{E}\Big[1,\ b_0 c_4 - b_4 c_4,\ v_0 w_4 - v_4 w_4,$$
$$\frac{1}{2} - \frac{t^2}{2} - \frac{\lambda}{2} + \frac{t^2\lambda}{2} - c_4 - t c_4 + \lambda c_4 + t\lambda c_4 + c_0 c_4 - c_4^2 - t v_0 w_4 - t^2 v_0 w_4 + t\lambda v_0 w_4 + t^2\lambda v_0 w_4 + c_0 v_0 w_4 - c_4 v_0 w_4 -$$
$$t c_4 v_0 w_4 + \lambda c_4 v_0 w_4 + t\lambda c_4 v_0 w_4 + 2 v_4 w_4 + 2 t v_4 w_4 + t^2 v_4 w_4 - \lambda v_4 w_4 - 2t\lambda v_4 w_4 - t^2\lambda v_4 w_4 - c_0 v_4 w_4 + 2 c_4 v_4 w_4 +$$
$$t c_4 v_4 w_4 - \lambda c_4 v_4 w_4 - t\lambda c_4 v_4 w_4 - \frac{1}{2} t v_0^2 w_4^2 - \frac{1}{4} t^2 v_0^2 w_4^2 + \frac{1}{4}\lambda v_0^2 w_4^2 + \frac{1}{2} t\lambda v_0^2 w_4^2 + \frac{1}{4} t^2\lambda v_0^2 w_4^2 + v_0 v_4 w_4^2 + \frac{3}{2} t v_0 v_4 w_4^2 +$$
$$\frac{1}{2} t^2 v_0 v_4 w_4^2 - \lambda v_0 v_4 w_4^2 - \frac{3}{2} t\lambda v_0 v_4 w_4^2 - \frac{1}{2} t^2\lambda v_0 v_4 w_4^2 - v_4^2 w_4^2 - t v_4^2 w_4^2 - \frac{1}{4} t^2 v_4^2 w_4^2 + \frac{3}{4}\lambda v_4^2 w_4^2 + t\lambda v_4^2 w_4^2 + \frac{1}{4} t^2\lambda v_4^2 w_4^2\Big],$$
$$\mathbb{E}\Big[\frac{1}{t},\ b_0 c_3 - b_3 c_3 + b_3 c_{12} - b_{12} c_{12},\ \frac{v_0 w_3}{t} - \frac{v_3 w_3}{t} + \frac{v_3 w_{12}}{t} - \frac{v_{12} w_{12}}{t},$$
$$\frac{1}{t^4} - \frac{1}{t^2} - \frac{\lambda}{t^4} + \frac{\lambda}{t^2} - \frac{c_3}{t^4} - \frac{c_3}{t^3} + \frac{\lambda c_3}{t^4} + \frac{\lambda c_3}{t^3} + \frac{c_0 c_3}{t^4} - \frac{c_3^2}{t^4} + \frac{c_{12}}{t^4} - \frac{c_{12}}{t^3} + \frac{\lambda c_{12}}{t^4} + \frac{\lambda c_{12}}{t^3} + \frac{c_3 c_{12}}{t^4} - \frac{c_{12}^2}{t^4} - \frac{v_0 w_3}{t^3} - \frac{v_0 w_3}{t^2} + \frac{\lambda v_0 w_3}{t^3} +$$
$$\frac{\lambda v_0 w_3}{t^2} + \frac{c_0 v_0 w_3}{t^4} - \frac{c_3 v_0 w_3}{t^4} - \frac{c_3 v_0 w_3}{t^3} + \frac{\lambda c_3 v_0 w_3}{t^4} + \frac{\lambda c_3 v_0 w_3}{t^3} + \frac{2 v_3 w_3}{t^4} + \frac{2 v_3 w_3}{t^3} + \frac{v_3 w_3}{t^2} - \frac{\lambda v_3 w_3}{t^4} - \frac{2\lambda v_3 w_3}{t^3} - \frac{\lambda v_3 w_3}{t^2} -$$
$$\frac{c_0 v_3 w_3}{t^4} + \frac{2 c_3 v_3 w_3}{t^4} + \frac{c_3 v_3 w_3}{t^3} - \frac{\lambda c_3 v_3 w_3}{t^4} - \frac{\lambda c_3 v_3 w_3}{t^3} - \frac{c_{12} v_3 w_3}{t^4} - \frac{v_0^2 w_3^2}{2t^3} - \frac{v_0^2 w_3^2}{4t^2} + \frac{\lambda v_0^2 w_3^2}{4t^4} + \frac{\lambda v_0^2 w_3^2}{2t^3} + \frac{\lambda v_0^2 w_3^2}{4t^2} +$$
$$\frac{v_0 v_3 w_3^2}{t^4} + \frac{3 v_0 v_3 w_3^2}{2t^3} + \frac{v_0 v_3 w_3^2}{2t^2} - \frac{\lambda v_0 v_3 w_3^2}{t^4} - \frac{3\lambda v_0 v_3 w_3^2}{2t^3} - \frac{\lambda v_0 v_3 w_3^2}{2t^2} - \frac{v_3^2 w_3^2}{t^4} - \frac{v_3^2 w_3^2}{t^3} - \frac{v_3^2 w_3^2}{4t^2} + \frac{3\lambda v_3^2 w_3^2}{4t^4} + \frac{\lambda v_3^2 w_3^2}{t^3} +$$
$$\frac{\lambda v_3^2 w_3^2}{4t^2} + \frac{v_3 w_{12}}{t^4} - \frac{v_3 w_{12}}{t^3} - \frac{v_3 w_{12}}{t^2} + \frac{\lambda v_3 w_{12}}{t^3} + \frac{\lambda v_3 w_{12}}{t^2} + \frac{c_3 v_3 w_{12}}{t^4} - \frac{c_{12} v_3 w_{12}}{t^4} - \frac{c_{12} v_3 w_{12}}{t^3} + \frac{\lambda c_{12} v_3 w_{12}}{t^4} + \frac{\lambda c_{12} v_3 w_{12}}{t^3} +$$
$$\frac{2 v_{12} w_{12}}{t^3} + \frac{v_{12} w_{12}}{t^2} - \frac{\lambda v_{12} w_{12}}{t^4} - \frac{2\lambda v_{12} w_{12}}{t^3} - \frac{\lambda v_{12} w_{12}}{t^2} - \frac{c_3 v_{12} w_{12}}{t^4} + \frac{2 c_{12} v_{12} w_{12}}{t^4} + \frac{c_{12} v_{12} w_{12}}{t^3} - \frac{\lambda c_{12} v_{12} w_{12}}{t^4} -$$
$$\frac{\lambda c_{12} v_{12} w_{12}}{t^3} - \frac{v_3^2 w_3 w_{12}}{t^4} + \frac{v_3 v_{12} w_3 w_{12}}{t^4} - \frac{v_3^2 w_{12}^2}{2t^3} - \frac{v_3^2 w_{12}^2}{4t^2} + \frac{\lambda v_3^2 w_{12}^2}{4t^4} + \frac{\lambda v_3^2 w_{12}^2}{2t^3} + \frac{\lambda v_3^2 w_{12}^2}{4t^2} + \frac{v_3 v_{12} w_{12}^2}{t^4} + \frac{3 v_3 v_{12} w_{12}^2}{2t^3} +$$
$$\frac{v_3 v_{12} w_{12}^2}{2t^2} - \frac{\lambda v_3 v_{12} w_{12}^2}{t^4} - \frac{3\lambda v_3 v_{12} w_{12}^2}{2t^3} - \frac{\lambda v_3 v_{12} w_{12}^2}{2t^2} - \frac{v_{12}^2 w_{12}^2}{t^4} - \frac{v_{12}^2 w_{12}^2}{t^3} - \frac{v_{12}^2 w_{12}^2}{4t^2} + \frac{3\lambda v_{12}^2 w_{12}^2}{4t^4} + \frac{\lambda v_{12}^2 w_{12}^2}{t^3} + \frac{\lambda v_{12}^2 w_{12}^2}{4t^2}\Big]\Big\}$$

```
tr ⟦8 ;;⟧ /. ℰ_𝔼 ⧴ {
  vars = Union@Cases[ℰ, (c | v | w)_, ∞],
  al = Numerator@Factor@ℰ⟦1⟧; al /= Coefficient[al, t, 0],
  ωs = CoefficientRules[ℰ⟦4⟧/al^5, vars] /. (p_ → c_) ⧴ (Factor[c] /. a_. al^m_. ⧴ ω^(m+5)) Times @@ (vars^p),
  ωs /. {c_ → 1/2, ω | w_ → 2}
}
```

$$\Big\{\Big\{\{c_0, c_9, c_{16}, v_0, v_9, v_{16}, w_0, w_9, w_{16}\}, \frac{2-t}{2},$$
$$\Big\{\frac{64 c_0^2}{(-2+t)\, t^{12}}, -\frac{64 c_0 c_9}{(-2+t)\, t^{12}}, \langle\!\langle 78 \rangle\!\rangle, -\frac{16(-1+t)(-24+15t^2-5t^3+22\lambda+2t\lambda-15t^2\lambda+5t^3\lambda)}{(-2+t)^3\, t^{12}}\Big\},$$
$$\Big\{\frac{16}{(-2+t)\, t^{12}}, -\frac{16}{(-2+t)\, t^{12}}, -\frac{16}{(-2+t)\, t^{12}}, \langle\!\langle 76 \rangle\!\rangle, \frac{1}{(-2+t)^4\, t^{12}}$$
$$64\,(20 - 32t + 39t^2 - 33t^3 + 29t^4 - 29t^6 + 20t^7 - 4t^8 - 12\lambda + 10t\lambda - 15t^2\lambda + 10t^3\lambda - 13t^4\lambda -$$
$$6t^5\lambda + 30t^6\lambda - 20t^7\lambda + 4t^8\lambda)\, v_{16}, -\frac{16(-1+t)(-24+15t^2-5t^3+22\lambda+2t\lambda-15t^2\lambda+5t^3\lambda)}{(-2+t)^3\, t^{12}}\Big\}\Big\}, \{\langle\!\langle 1 \rangle\!\rangle\},$$
$$\langle\!\langle 1 \rangle\!\rangle, \{\{c_0, v_0, w_0\}, 1 - 4t + \langle\!\langle 6 \rangle\!\rangle + t^6, \{\langle\!\langle 1 \rangle\!\rangle\}, \{16 v_0, 4, 64 v_0^2, 16 v_0, 4\}\}\Big\}$$

large output | show less | show more | show all | set size limit...

```
tr ⟦1 ;;⟧ /. ℰ_𝔼 ⧴ {
  vars = Union@Cases[ℰ, (c | v | w)_, ∞],
  al = Numerator@Factor@ℰ⟦1⟧,
  CoefficientRules[ℰ⟦4⟧, vars] /. (p_ → cc_) ⧴ (mon = Times @@ (vars^p);
     Denominator@Factor[ (al^Exponent[mon/.v_⧴v, v] cc) / (al^Exponent[mon/.c_⧴c, c] al^2) ]) mon
}
```

$\{\{\{\}, 1, \{\}\}, \{\{c_{0}, c_{4}, v_{0}, v_{4}, w_{4}\}, 1,$
$\{c_{0} c_{4}, c_{0} v_{0} w_{4}, c_{0} v_{4} w_{4}, c_{4}^{2}, c_{4} v_{0} w_{4}, c_{4} v_{4} w_{4}, c_{4}, 4 v_{0}^{2} w_{4}^{2}, 2 v_{0} v_{4} w_{4}^{2}, v_{0} w_{4}, 4 v_{4}^{2} w_{4}^{2}, v_{4} w_{4}, 2\}\},$
$\{\{c_{0}, c_{3}, c_{12}, v_{0}, v_{3}, v_{12}, w_{3}, w_{12}\}, 1, \{t^{4} c_{0} c_{3}, t^{4} c_{0} v_{0} w_{3}, t^{4} c_{0} v_{3} w_{3}, t^{4} c_{3}^{2}, t^{4} c_{3} c_{12}, t^{4} c_{3} v_{0} w_{3}, t^{4} c_{3} v_{3} w_{3},$
$t^{4} c_{3} v_{3} w_{12}, t^{4} c_{3} v_{12} w_{12}, t^{4} c_{3}, t^{4} c_{12}^{2}, t^{4} c_{12} v_{3} w_{3}, t^{4} c_{12} v_{3} w_{12}, t^{4} c_{12} v_{12} w_{12}, t^{4} c_{12}, 4 t^{4} v_{0}^{2} w_{3}^{2}, 2 t^{4} v_{0} v_{3} w_{3}^{2}, t^{3} v_{0} w_{3},$
$4 t^{4} v_{3}^{2} w_{3}^{2}, t^{4} v_{3}^{2} w_{3} w_{12}, 4 t^{4} v_{3}^{2} w_{12}^{2}, t^{4} v_{3} v_{12} w_{3} w_{12}, 2 t^{4} v_{3} v_{12} w_{12}^{2}, t^{4} v_{3} w_{3}, t^{4} v_{3} w_{12}, 4 t^{4} v_{12}^{2} w_{12}^{2}, t^{4} v_{12} w_{12}, t^{4}\}\},$
$\{\{c_{0}, c_{11}, v_{0}, v_{11}, w_{0}, w_{11}\}, 1, \{t^{6} c_{0}^{2}, t^{6} c_{0} c_{11}, t^{6} c_{0} v_{0} w_{0}, t^{5} c_{0} v_{0} w_{11}, t^{5} c_{0} v_{11} w_{0}, t^{6} c_{0} v_{11} w_{11}, t^{6} c_{0}, t^{6} c_{11}^{2},$
$t^{6} c_{11} v_{0} w_{0}, t^{5} c_{11} v_{0} w_{11}, t^{5} c_{11} v_{11} w_{0}, t^{6} c_{11} v_{11} w_{11}, t^{6} c_{11}, 4 t^{6} v_{0}^{2} w_{0}^{2}, 2 t^{5} v_{0}^{2} w_{0} w_{11}, 4 t^{4} v_{0}^{2} w_{11}^{2}, 2 t^{5} v_{0} v_{11} w_{0}^{2},$
$t^{6} v_{0} v_{11} w_{0} w_{11}, 2 t^{5} v_{0} v_{11} w_{11}^{2}, t^{6} v_{0} w_{0}, t^{5} v_{0} w_{11}, 4 t^{4} v_{11}^{2} w_{0}^{2}, 2 t^{5} v_{11}^{2} w_{0} w_{11}, 4 t^{6} v_{11}^{2} w_{11}^{2}, t^{5} v_{11} w_{0}, t^{6} v_{11} w_{11}, 2 t^{6}\}\},$
$\{\{c_{0}, c_{11}, c_{16}, v_{0}, v_{11}, v_{16}, w_{0}, w_{11}\}, 1, \{t^{10} c_{0}^{2}, t^{10} c_{0} c_{11}, t^{10} c_{0} c_{16}, t^{10} c_{0} v_{0} w_{0}, t^{9} c_{0} v_{0} w_{11},$
$t^{8} c_{0} v_{11} w_{0}, t^{10} c_{0} v_{11} w_{11}, t^{10} c_{0} v_{16} w_{0}, t^{10} c_{0}, t^{10} c_{11}^{2}, t^{10} c_{11} v_{0} w_{0}, t^{9} c_{11} v_{0} w_{11}, t^{8} c_{11} v_{11} w_{0},$
$t^{10} c_{11} v_{11} w_{11}, t^{10} c_{11}, t^{10} c_{16} v_{0} w_{0}, t^{8} c_{16} v_{11} w_{0}, t^{10} c_{16} v_{16} w_{0}, t^{10} c_{16}, 4 t^{10} v_{0}^{2} w_{0}^{2}, 2 t^{9} v_{0}^{2} w_{0} w_{11},$
$4 t^{8} v_{0}^{2} w_{11}^{2}, 2 t^{8} v_{0} v_{11} w_{0}^{2}, t^{10} v_{0} v_{11} w_{0} w_{11}, 2 t^{9} v_{0} v_{11} w_{11}^{2}, 2 t^{10} v_{0} v_{16} w_{0}^{2}, t^{10} v_{0} w_{0}, t^{9} v_{0} w_{11}, 4 t^{6} v_{11}^{2} w_{0}^{2},$
$2 t^{8} v_{11}^{2} w_{0} w_{11}, 4 t^{10} v_{11}^{2} w_{11}^{2}, 2 t^{8} v_{11} v_{16} w_{0}^{2}, t^{8} v_{11} w_{0}, t^{10} v_{11} w_{11}, 4 t^{10} v_{16}^{2} w_{0}^{2}, t^{10} v_{16} w_{0}, t^{10}\}\},$
$\{\{c_{0}, c_{10}, c_{16}, v_{0}, v_{10}, v_{16}, w_{0}, w_{10}, w_{16}\}, 1, \{t^{14} c_{0}^{2}, t^{14} c_{0} c_{10}, t^{14} c_{0} c_{16}, t^{14} c_{0} v_{0} w_{0}, t^{13} c_{0} v_{0} w_{10}, t^{12} c_{0} v_{10} w_{0},$
$t^{14} c_{0} v_{10} w_{10}, t^{14} c_{0} v_{16} w_{0}, t^{14} c_{0} v_{16} w_{16}, t^{14} c_{0}, t^{14} c_{10}^{2}, t^{14} c_{10} c_{16}, t^{14} c_{10} v_{0} w_{0}, t^{13} c_{10} v_{0} w_{10}, t^{12} c_{10} v_{10} w_{0},$
$t^{14} c_{10} v_{10} w_{10}, t^{14} c_{10} v_{10} w_{16}, t^{14} c_{10} v_{16} w_{16}, t^{14} c_{10}, t^{14} c_{16}^{2}, t^{14} c_{16} v_{0} w_{0}, t^{12} c_{16} v_{10} w_{0}, t^{13} c_{16} v_{10} w_{10}, t^{14} c_{16} v_{10} w_{16},$
$t^{14} c_{16} v_{16} w_{0}, t^{14} c_{16} v_{16} w_{16}, t^{14} c_{16}, 4 t^{14} v_{0}^{2} w_{0}^{2}, 2 t^{13} v_{0}^{2} w_{0} w_{10}, 4 t^{12} v_{0}^{2} w_{10}^{2}, 2 t^{12} v_{0} v_{10} w_{0}^{2}, t^{14} v_{0} v_{10} w_{0} w_{10},$
$2 t^{13} v_{0} v_{10} w_{10}^{2}, 2 t^{14} v_{0} v_{16} w_{0}^{2}, t^{14} v_{0} v_{16} w_{0} w_{16}, t^{14} v_{0} w_{0}, t^{13} v_{0} w_{10}, 4 t^{10} v_{10}^{2} w_{0}^{2}, 2 t^{12} v_{10}^{2} w_{0} w_{10}, t^{12} v_{10}^{2} w_{0} w_{16},$
$4 t^{14} v_{10}^{2} w_{10}^{2}, t^{13} v_{10}^{2} w_{10} w_{16}, 4 t^{14} v_{10}^{2} w_{16}^{2}, 2 t^{12} v_{10} v_{16} w_{0}^{2}, t^{12} v_{10} v_{16} w_{0} w_{16}, t^{13} v_{10} v_{16} w_{10} w_{16}, 2 t^{14} v_{10} v_{16} w_{16}^{2},$
$t^{12} v_{10} w_{0}, t^{14} v_{10} w_{10}, t^{14} v_{10} w_{16}, 4 t^{14} v_{16}^{2} w_{0}^{2}, t^{14} v_{16}^{2} w_{0} w_{16}, 4 t^{14} v_{16}^{2} w_{16}^{2}, t^{14} v_{16} w_{0}, t^{14} v_{16} w_{16}, 2 t^{14}\}\},$
$\{\{c_{0}, c_{9}, c_{16}, v_{0}, v_{9}, v_{16}, w_{0}, w_{9}, w_{16}\}, 2 - t, \{t^{10} c_{0}^{2}, t^{10} c_{0} c_{9}, t^{10} c_{0} c_{16}, t^{10} c_{0} v_{0} w_{0}, t^{9} c_{0} v_{0} w_{9}, t^{8} c_{0} v_{9} w_{0},$
$t^{10} c_{0} v_{9} w_{9}, t^{10} c_{0} v_{16} w_{0}, t^{10} c_{0} v_{16} w_{9}, t^{10} c_{0} v_{16} w_{16}, t^{10} c_{0}, t^{10} c_{9}^{2}, t^{10} c_{9} c_{16}, t^{10} c_{9} v_{0} w_{0}, t^{9} c_{9} v_{0} w_{9}, t^{8} c_{9} v_{9} w_{0},$
$t^{10} c_{9} v_{9} w_{9}, t^{10} c_{9} v_{9} w_{16}, t^{8} c_{9} v_{16} w_{0}, t^{10} c_{9} v_{16} w_{9}, t^{10} c_{9} v_{16} w_{16}, t^{10} c_{9}, t^{10} c_{16}^{2}, t^{10} c_{16} v_{0} w_{0}, t^{8} c_{16} v_{9} w_{0},$
$t^{10} c_{16} v_{9} w_{9}, t^{10} c_{16} v_{9} w_{16}, t^{10} c_{16} v_{16} w_{0}, t^{10} c_{16} v_{16} w_{9}, t^{10} c_{16} v_{16} w_{16}, t^{10} c_{16}, 4 t^{10} v_{0}^{2} w_{0}^{2}, 2 t^{9} v_{0}^{2} w_{0} w_{9}, 4 t^{8} v_{0}^{2} w_{9}^{2},$
$2 t^{8} v_{0} v_{9} w_{0}^{2}, t^{10} v_{0} v_{9} w_{0} w_{9}, 2 t^{9} v_{0} v_{9} w_{9}^{2}, 2 t^{10} v_{0} v_{16} w_{0}^{2}, t^{10} v_{0} v_{16} w_{0} w_{9}, t^{10} v_{0} v_{16} w_{0} w_{16}, 2 t^{9} v_{0} v_{16} w_{9}^{2}, t^{10} v_{0} w_{0},$
$t^{9} v_{0} w_{9}, 4 t^{6} v_{9}^{2} w_{0}^{2}, 2 t^{8} v_{9}^{2} w_{0} w_{9}, t^{8} v_{9}^{2} w_{0} w_{16}, 4 t^{10} v_{9}^{2} w_{9}^{2}, t^{10} v_{9}^{2} w_{9} w_{16}, 4 t^{10} v_{9}^{2} w_{16}^{2}, 2 t^{8} v_{9} v_{16} w_{0}^{2}, t^{8} v_{9} v_{16} w_{0} w_{9},$
$t^{8} v_{9} v_{16} w_{0} w_{16}, 2 t^{10} v_{9} v_{16} w_{9}^{2}, t^{10} v_{9} v_{16} w_{9} w_{16}, t^{10} v_{9} v_{16} w_{16}^{2}, t^{8} v_{9} w_{0}, t^{10} v_{9} w_{9}, t^{10} v_{9} w_{16}, 4 t^{10} v_{16}^{2} w_{0}^{2},$
$2 t^{10} v_{16}^{2} w_{0} w_{9}, t^{10} v_{16}^{2} w_{0} w_{16}, 4 t^{10} v_{16}^{2} w_{9}^{2}, t^{10} v_{16}^{2} w_{9} w_{16}, 4 t^{10} v_{16}^{2} w_{16}^{2}, t^{10} v_{16} w_{0}, t^{10} v_{16} w_{9}, t^{10} v_{16} w_{16}, t^{10}\}\},$
$\{\{c_{0}, c_{9}, c_{16}, v_{0}, v_{9}, v_{16}, w_{0}, w_{9}, w_{16}\}, 2 - t, \{t^{12} c_{0}^{2}, t^{12} c_{0} c_{9}, t^{12} c_{0} c_{16}, t^{12} c_{0} v_{0} w_{0}, t^{11} c_{0} v_{0} w_{9},$
$t^{11} c_{0} v_{0} w_{16}, t^{10} c_{0} v_{9} w_{0}, t^{12} c_{0} v_{9} w_{9}, t^{11} c_{0} v_{9} w_{16}, t^{12} c_{0} v_{16} w_{0}, t^{12} c_{0} v_{16} w_{9}, t^{12} c_{0} v_{16} w_{16}, t^{12} c_{0}, t^{12} c_{9}^{2},$
$t^{12} c_{9} c_{16}, t^{12} c_{9} v_{0} w_{0}, t^{11} c_{9} v_{0} w_{9}, t^{9} c_{9} v_{0} w_{16}, t^{10} c_{9} v_{9} w_{0}, t^{12} c_{9} v_{9} w_{9}, t^{11} c_{9} v_{9} w_{16}, t^{10} c_{9} v_{16} w_{0}, t^{12} c_{9} v_{16} w_{9},$
$t^{12} c_{9} v_{16} w_{16}, t^{12} c_{9}, t^{12} c_{16}^{2}, t^{12} c_{16} v_{0} w_{0}, t^{11} c_{16} v_{0} w_{16}, t^{10} c_{16} v_{9} w_{0}, t^{12} c_{16} v_{9} w_{9}, t^{11} c_{16} v_{9} w_{16}, t^{12} c_{16} v_{16} w_{0},$
$t^{12} c_{16} v_{16} w_{9}, t^{12} c_{16} v_{16} w_{16}, t^{12} c_{16}, 4 t^{12} v_{0}^{2} w_{0}^{2}, 2 t^{11} v_{0}^{2} w_{0} w_{9}, 2 t^{11} v_{0}^{2} w_{0} w_{16}, 4 t^{10} v_{0}^{2} w_{9}^{2}, 2 t^{10} v_{0}^{2} w_{9} w_{16},$
$4 t^{10} v_{0}^{2} w_{16}^{2}, 2 t^{10} v_{0} v_{9} w_{0}^{2}, t^{12} v_{0} v_{9} w_{0} w_{9}, t^{11} v_{0} v_{9} w_{0} w_{16}, 2 t^{11} v_{0} v_{9} w_{9}^{2}, t^{9} v_{0} v_{9} w_{9} w_{16}, 2 t^{10} v_{0} v_{9} w_{16}^{2}, 2 t^{12} v_{0} v_{16} w_{0}^{2},$
$t^{12} v_{0} v_{16} w_{0} w_{9}, t^{12} v_{0} v_{16} w_{0} w_{16}, 2 t^{11} v_{0} v_{16} w_{9}^{2}, t^{11} v_{0} v_{16} w_{9} w_{16}, 2 t^{11} v_{0} v_{16} w_{16}^{2}, t^{12} v_{0} w_{0}, t^{11} v_{0} w_{9}, t^{10} v_{0} w_{16},$
$4 t^{8} v_{9}^{2} w_{0}^{2}, 2 t^{10} v_{9}^{2} w_{0} w_{9}, 2 t^{9} v_{9}^{2} w_{0} w_{16}, 4 t^{12} v_{9}^{2} w_{9}^{2}, 2 t^{11} v_{9}^{2} w_{9} w_{16}, 4 t^{10} v_{9}^{2} w_{16}^{2}, 2 t^{10} v_{9} v_{16} w_{0}^{2}, t^{10} v_{9} v_{16} w_{0} w_{9},$
$t^{11} v_{9} v_{16} w_{0} w_{16}, 2 t^{12} v_{9} v_{16} w_{9}^{2}, t^{12} v_{9} v_{16} w_{9} w_{16}, 2 t^{11} v_{9} v_{16} w_{16}^{2}, t^{10} v_{9} w_{0}, t^{12} v_{9} w_{9}, t^{11} v_{9} w_{16}, 4 t^{12} v_{16}^{2} w_{0}^{2},$
$2 t^{12} v_{16}^{2} w_{0} w_{9}, 2 t^{12} v_{16}^{2} w_{0} w_{16}, 4 t^{12} v_{16}^{2} w_{9}^{2}, 2 t^{12} v_{16}^{2} w_{9} w_{16}, 4 t^{12} v_{16}^{2} w_{16}^{2}, t^{12} v_{16} w_{0}, t^{12} v_{16} w_{9}, t^{12} v_{16} w_{16}, 2 t^{12}\}\},$
$\{\{c_{0}, c_{8}, c_{16}, v_{0}, v_{8}, v_{16}, w_{0}, w_{8}, w_{16}\}, 2 - t, \{t^{8} c_{0}^{2}, t^{8} c_{0} c_{8}, t^{8} c_{0} c_{16}, t^{8} c_{0} v_{0} w_{0}, t^{8} c_{0} v_{0} w_{8}, t^{7} c_{0} v_{0} w_{16},$
$t^{6} c_{0} v_{8} w_{0}, t^{8} c_{0} v_{8} w_{8}, t^{7} c_{0} v_{8} w_{16}, t^{8} c_{0} v_{16} w_{0}, t^{9} c_{0} v_{16} w_{8}, t^{8} c_{0} v_{16} w_{16}, t^{8} c_{0}, t^{8} c_{8}^{2}, t^{8} c_{8} c_{16}, t^{8} c_{8} v_{0} w_{0},$
$t^{5} c_{8} v_{0} w_{16}, t^{6} c_{8} v_{8} w_{0}, t^{9} c_{8} v_{8} w_{8}, t^{7} c_{8} v_{8} w_{16}, t^{6} c_{8} v_{16} w_{0}, t^{9} c_{8} v_{16} w_{8}, t^{8} c_{8} v_{16} w_{16}, t^{8} c_{8}, t^{8} c_{16}^{2}, t^{8} c_{16} v_{0} w_{0},$
$t^{7} c_{16} v_{0} w_{16}, t^{6} c_{16} v_{8} w_{0}, t^{9} c_{16} v_{8} w_{8}, t^{7} c_{16} v_{8} w_{16}, t^{8} c_{16} v_{16} w_{0}, t^{9} c_{16} v_{16} w_{8}, t^{8} c_{16} v_{16} w_{16}, t^{8} c_{16}, 4 t^{8} v_{0}^{2} w_{0}^{2},$
$2 t^{8} v_{0}^{2} w_{0} w_{8}, 2 t^{7} v_{0}^{2} w_{0} w_{16}, 4 t^{8} v_{0}^{2} w_{8}^{2}, 2 t^{7} v_{0}^{2} w_{8} w_{16}, 4 t^{6} v_{0}^{2} w_{16}^{2}, 2 t^{6} v_{0} v_{8} w_{0}^{2}, t^{8} v_{0} v_{8} w_{0} w_{8}, t^{7} v_{0} v_{8} w_{0} w_{16}, 2 t^{9} v_{0} v_{8} w_{8}^{2},$
$t^{7} v_{0} v_{8} w_{8} w_{16}, 2 t^{6} v_{0} v_{8} w_{16}^{2}, 2 t^{8} v_{0} v_{16} w_{0}^{2}, t^{9} v_{0} v_{16} w_{0} w_{8}, t^{8} v_{0} v_{16} w_{0} w_{16}, 2 t^{7} v_{0} v_{16} w_{8}^{2}, t^{8} v_{0} v_{16} w_{8} w_{16}, 2 t^{7} v_{0} v_{16} w_{16}^{2},$
$t^{8} v_{0} w_{0}, t^{7} v_{0} w_{8}, t^{6} v_{0} w_{16}, 4 t^{4} v_{8}^{2} w_{0}^{2}, 2 t^{7} v_{8}^{2} w_{0} w_{8}, 2 t^{5} v_{8}^{2} w_{0} w_{16}, 4 t^{10} v_{8}^{2} w_{8}^{2}, 2 t^{8} v_{8}^{2} w_{8} w_{16}, 4 t^{6} v_{8}^{2} w_{16}^{2}, 2 t^{6} v_{8} v_{16} w_{0}^{2},$
$t^{7} v_{8} v_{16} w_{0} w_{8}, t^{7} v_{8} v_{16} w_{0} w_{16}, 2 t^{10} v_{8} v_{16} w_{8}^{2}, t^{9} v_{8} v_{16} w_{8} w_{16}, 2 t^{7} v_{8} v_{16} w_{16}^{2}, t^{6} v_{8} w_{0}, t^{9} v_{8} w_{8}, t^{7} v_{8} w_{16}, 4 t^{8} v_{16}^{2} w_{0}^{2},$
$2 t^{9} v_{16}^{2} w_{0} w_{8}, 2 t^{8} v_{16}^{2} w_{0} w_{16}, 4 t^{10} v_{16}^{2} w_{8}^{2}, 2 t^{9} v_{16}^{2} w_{8} w_{16}, 4 t^{8} v_{16}^{2} w_{16}^{2}, t^{8} v_{16} w_{0}, t^{9} v_{16} w_{8}, t^{8} v_{16} w_{16}, 2 t^{8}\}\},$
$\{\{c_{0}, c_{16}, v_{0}, v_{16}, w_{0}, w_{16}\}, -1 + 3 t - 2 t^{3} + t^{4}, \{t^{14} c_{0}^{2}, t^{14} c_{0} c_{16}, t^{14} c_{0} v_{0} w_{0}, t^{13} c_{0} v_{0} w_{16},$
$t^{14} c_{0} v_{16} w_{0}, t^{14} c_{0} v_{16} w_{16}, t^{14} c_{0}, t^{14} c_{16}^{2}, t^{14} c_{16} v_{0} w_{0}, t^{13} c_{16} v_{0} w_{16}, t^{14} c_{16} v_{16} w_{0}, t^{14} c_{16} v_{16} w_{16},$
$t^{14} c_{16}, 4 t^{14} v_{0}^{2} w_{0}^{2}, 2 t^{13} v_{0}^{2} w_{0} w_{16}, 4 t^{12} v_{0}^{2} w_{16}^{2}, 2 t^{14} v_{0} v_{16} w_{0}^{2}, t^{14} v_{0} v_{16} w_{0} w_{16}, 2 t^{13} v_{0} v_{16} w_{16}^{2},$
$t^{14} v_{0} w_{0}, t^{12} v_{0} w_{16}, 4 t^{14} v_{16}^{2} w_{0}^{2}, 2 t^{14} v_{16}^{2} w_{0} w_{16}, 4 t^{14} v_{16}^{2} w_{16}^{2}, t^{14} v_{16} w_{0}, t^{14} v_{16} w_{16}, 2 t^{14}\}\},$
$\{\{c_{0}, v_{0}, w_{0}\}, -1 + 4 t - 4 t^{2} + 3 t^{3} - 4 t^{4} + 4 t^{5} - t^{6}, \{t^{12} c_{0} v_{0} w_{0}, t^{12} c_{0}, 2 t^{12} v_{0}^{2} w_{0}^{2}, t^{12} v_{0} w_{0}, 2 t^{12}\}\}\}$

```
tr⟦7 ;;⟧ /. ℰ_𝔼 ↦ {
  vars = Union@Cases[ℰ, (c | v | w)_, ∞],
  al = Numerator@Factor@ℰ⟦1⟧,
  CoefficientRules[ℰ⟦4⟧, vars] /. (p_ → cc_) ↦ (mon = Times @@ (vars^p);
     Factor[ al^Exponent[mon/.v_↦v, v] cc / (al^Exponent[mon/.c_↦c, c] al^2) ]) mon
}
```

$$\{\{\{c_0, c_9, c_{16}, v_0, v_9, v_{16}, w_0, w_9, w_{16}\}, 2-t, \{-\frac{2c_0^2}{t^{10}}, \frac{2c_0c_9}{t^{10}}, \frac{c_0c_{16}}{t^{10}}, -\frac{(-2+t)^2(1+t)(-4+t-3t^2+\lambda+3t^2\lambda)c_0v_0w_0}{t^{10}},$$
$$\cdots 61 \cdots, \frac{(8-26t+32t^2-14t^3-9t^4+9t^5-2t^6+2\lambda+8t\lambda-12t^2\lambda+4t^3\lambda+11t^4\lambda-9t^5\lambda+2t^6\lambda)v_{16}w_9}{t^{10}}, \frac{(4-2t+t^2-2\lambda-2t\lambda)v_{16}w_{16}}{t^{10}},$$
$$\frac{(-1+t)(-10+6t^2-2t^3+9\lambda+t\lambda-6t^2\lambda+2t^3\lambda)}{t^{10}}\}\}, \cdots 3 \cdots, \{\{c_0, v_0, w_0\}, -1+\cdots 9 \cdots,$$
$$\{\frac{2(1+t)(\cdots 9 \cdots+t^6)^2(-1+\lambda)c_0v_0w_0}{t^{12}}, \frac{(1+t)(\cdots 1 \cdots)c_0}{t^{12}}, -\frac{\cdots 1 \cdots}{2\,\cdots 1 \cdots}, -\frac{\cdots 1 \cdots}{t^{12}}, -\frac{(-1+t)(-5+\cdots 45 \cdots+2t^{15}\lambda)}{2t^{12}}\}\}\}$$

large output | show less | show more | show all | set size limit...