Pensieve header: Perturbed Alexander-Burau Invariants. DPG code from PerturbedHeisenberg2.nb at pensieve://Classes/21-1350-KnotTheory/. Continued pensieve://Projects/APerturbedAlexanderInvariant/.

In[ ]:=
```
Once[<< KnotTheory`];
```

Loading KnotTheory` version of February 2, 2020, 10:53:45.2097.
Read more at http://katlas.org/wiki/KnotTheory.

In[ ]:=
```
PD[GST48] = PD[X[1, 15, 2, 14], X[29, 2, 30, 3], X[40, 4, 41, 3],
    X[4, 44, 5, 43], X[5, 26, 6, 27], X[95, 7, 96, 6], X[7, 1, 8, 96], X[8, 14, 9, 13],
    X[28, 9, 29, 10], X[41, 11, 42, 10], X[11, 43, 12, 42], X[12, 27, 13, 28],
    X[15, 31, 16, 30], X[61, 16, 62, 17], X[72, 17, 73, 18], X[83, 18, 84, 19],
    X[34, 20, 35, 19], X[20, 89, 21, 90], X[92, 21, 93, 22], X[22, 79, 23, 80],
    X[23, 68, 24, 69], X[24, 57, 25, 58], X[56, 25, 57, 26], X[31, 63, 32, 62],
    X[32, 74, 33, 73], X[33, 85, 34, 84], X[35, 50, 36, 51], X[81, 37, 82, 36],
    X[70, 38, 71, 37], X[59, 39, 60, 38], X[54, 39, 55, 40], X[55, 45, 56, 44],
    X[45, 59, 46, 58], X[46, 70, 47, 69], X[47, 81, 48, 80], X[91, 49, 92, 48],
    X[49, 91, 50, 90], X[82, 52, 83, 51], X[71, 53, 72, 52], X[60, 54, 61, 53],
    X[74, 63, 75, 64], X[85, 64, 86, 65], X[65, 76, 66, 77], X[66, 87, 67, 88],
    X[94, 67, 95, 68], X[86, 75, 87, 76], X[77, 88, 78, 89], X[93, 78, 94, 79]];
```

In[ ]:=
```
ThinPosition[K_] := Module[{todo, done, pd, c},
  todo = List @@ PD@K; done = {}; pd = PD[];
  While[todo =!= {},
   AppendTo[pd, c = RandomChoice@MaximalBy[todo, Length[done ⋂ List @@ #] &]];
   todo = DeleteCases[todo, c];
   done = done ⋃ List @@ c];
  pd ]
```

In[ ]:=
```
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.";
```

In[ ]:=
```
RVK[pd_PD] := Module[{n, xs, x, rots, front = {1}, k},
    n = Length@pd; rots = Table[0, {2 n}];
    xs = Cases[pd, x_X :> [ Xp[x〚4〛, x〚1〛]  PositiveQ@x
                            Xm[x〚2〛, x〚1〛]     True    ];
    For[k = 1, k ≤ 2 n, ++k,
     If[FreeQ[front, -k],
       front = Flatten@Replace[front, k → (xs /. {
                  Xp[k, l_] | Xm[l_, k] :> {l + 1, k + 1, -l},
                  Xp[l_, k] | Xm[k, l_] :> (++rots〚l〛; {-l, k + 1, l + 1}),
                  _Xp | _Xm :> {}
                }), {1}],
       Cases[front, k | -k] /. {k, -k} :> --rots〚k〛;
      ]
    ];
    RVK[xs, rots] ];
RVK[K_] := RVK[PD[K]];
```

In[ ]:=
```
rot_i[n_] := (*rot_i[n]=*) [  η_i                       n == 0
                              C_$ rot_i[n - 1] // m_{i,$→i}  n > 0
                              C̄_$ rot_i[n + 1] // m_{i,$→i}  n < 0
```

In[ ]:=
```
Z[K_] := Z[RVK@K];
Z[rvk_RVK] := Module[{ξ, done, st, c, χ, i, j, k},
   ξ = 1; done = {}; st = Range[2 Length[rvk〚1〛]];
   Do[
    {i, j} = List @@ c;
    χ = c /. {_Xp :> R_{i,j}, _Xm :> R̄_{i,j}};
    Do[χ = (rot_0[rvk〚2, k〛] χ) // m_{0,k→k}, {k, {i, j}}];
    ξ *= χ;
    Do[
     If[MemberQ[done, k + 1], ξ = ξ // m_{k,k+1→k}; st = st /. k + 1 → k];
     If[MemberQ[done, k - 1], ξ = ξ // m_{st〚k-1〛,k→st〚k-1〛}; st = st /. k → st〚k - 1〛],
     {k, {i, j}}];
    done = done ⋃ {i, j},
    {c, rvk〚1〛}
   ];
   Factor@ξ
  ]
```

In[ ]:=
```
ZF[K_] := Z@ThinPosition@K;
```

In[ ]:=
```
$k=1;
```

```
In[◦]:=  CCF[ℰ_] := ExpandDenominator@ExpandNumerator@Together[ℰ];
```

```
In[◦]:=  CF[ℰ_List] := CF /@ ℰ;
        CF[ℰ_εSeries] := CF /@ ℰ;
        CF[ℰ_]  := Module[
            {vs = Cases[ℰ, (p | x | π | ξ)_, ∞] ⋃ {p | x | π | ξ}},
            Total[CoefficientRules[Expand[ℰ], vs] /. (ps_ → c_) ⧴ CCF[c] (Times @@ vs^ps)]
          ];
        CF[ℰ_𝔼] := CF /@ ℰ;
        CF[γ_Γ] := CF /@ γ;
        CF[𝔼_sp___[ℰs___]] := CF /@ 𝔼_sp[ℰs];
```

```
In[◦]:=  εSeries /: S1_εSeries ≡ S2_εSeries :=
            Length[S1] == Length[S2] ∧ Inner[CF[#1] == CF[#2] &, S1, S2, And];
        εSeries[0] := εSeries @@ Table[0, $k + 1];
        εSeries /: S1_εSeries + S2_εSeries :=
            εSeries @@ Table[S1〚k〛 + S2〚k〛, {k, Min[Length@S1, Length@S2]}];
        εSeries /: S1_εSeries * S2_εSeries := εSeries @@
            Table[Sum[S1〚j + 1〛 * S2〚k - j + 1〛, {j, 0, k}], {k, 0, Min[Length@S1, Length@S2] - 1}];
        εSeries /: c_ * S_εSeries := (c #) & /@ S;
        εSeries /: ∂_vs___ S_εSeries := (s ↦ ∂_vs s) /@ S;
```

```
In[◦]:=  {p*, x*, π*, ξ*} = {π, ξ, p, x};
        (vs_List)* := (v ↦ v*) /@ vs;
        (u_i_)* := (u*)_i;
```

```
In[◦]:=  𝔼 /: 𝔼[ω1_, Q1_, P1_] ≡ 𝔼[ω2_, Q2_, P2_] := CF[ω1 == ω2] ∧ CF[Q1 == Q2] ∧ (P1 ≡ P2);
        𝔼 /: 𝔼[ω1_, Q1_, P1_] 𝔼[ω2_, Q2_, P2_] := 𝔼[ω1 ω2, Q1 + Q2, P1 + P2];
        𝔼_d1→r1_[ℰ1s___] ≡ 𝔼_d2→r2_[ℰ2s___] ^:= (d1 == d2) ∧ (r1 == r2) ∧ (𝔼[ℰ1s] ≡ 𝔼[ℰ2s]);
        𝔼_d1→r1_[ℰ1s___] 𝔼_d2→r2_[ℰ2s___] ^:= 𝔼_(d1⋃d2)→(r1⋃r2) @@ (𝔼[ℰ1s] 𝔼[ℰ2s]);
```

```
In[◦]:=  Zip1_{} = Identity;
        Zip1_vs_ @ ⟨ℱ_, 𝔼[ω_, Q_, P_]⟩ := Module[{ℐ, F, G, u, v},
          ℐ = IdentityMatrix@Length@vs;
          F = Table[∂_u,v ℱ, {u, vs*}, {v, vs*}];
          G = Table[∂_u,v Q, {u, vs}, {v, vs}];
          CF /@ ⟨
            vs*.F.Inverse[ℐ - G.F].vs* / 2,
            𝔼[PowerExpand@Factor[ω Det[ℐ - G.F]^-1/2], Q - vs.G.vs / 2, P]
            ⟩
          ]
```

```
In[•]:=  Zip2_{} = Identity;
         Zip2_vs_ @⟨ℱ_, 𝔼[ω_, Q_, P_]⟩ := Module[{F, Y, u, v},
           F = Table[∂_{u,v} ℱ, {u, vs*}, {v, vs*}];
           Y = Table[∂_v Q, {v, vs}];
           CF /@ ⟨ℱ, 𝔼[ω, Q - Y.vs + Y.F.Y / 2, P /. Thread[vs → vs + F.Y]]⟩
          ]
```

```
In[•]:=  Zip3_vs_ @⟨ℱ_, 𝔼[ω_, Q_, P_]⟩ := Module[{Z, u, v, m, j},
           Z[0] = P;
           For[m = 0, m < 2 $k, ++m,
             Z[m + 1] = CF[ 1 / (2 (m + 1))
               Sum[∂_{u*,v*} ℱ (∂_{u,v} Z[m] + Sum[(∂_u Z[j]) (∂_v Z[m - j]), {j, 0, m}]), {u, vs}, {v, vs}]]
           ];
           𝔼[ω, Q, CF[Sum[Z[m], {m, 0, 2 $k}] /. Table[v → 0, {v, vs}]]]
          ]
```

```
In[•]:=  Zip_vs_ [ℱ_, ℰ_] := ⟨ℱ, ℰ⟩ // Zip1_vs // Zip2_vs // Zip3_vs
```

```
In[•]:=  𝔼_{d1_→r1_}[ℰ1s___] // 𝔼_{d2_→r2_}[ℰ2s___] := Module[{is = r1 ∩ d2, lvs},
           lvs = Flatten@Table[{x_{$@i}, p_{$@i}}, {i, is}];
           𝔼_{(d1∪Complement[d2,is])→(r2∪Complement[r1,is])} @@ (Zip_{lvs∪lvs*}[lvs*.lvs, Times[
               𝔼[ℰ1s] /. Table[(v : x | p)_i → v_{$@i}, {i, is}],
               𝔼[ℰ2s] /. Table[(v : ξ | π)_i → v_{$@i}, {i, is}]
             ]])
          ]
```

```
In[•]:=  η_i_ := 𝔼_{{}→{i}}[1, 0, ϵSeries[0]];
         m_{i_,j_→k_} := 𝔼_{{i,j}→{k}}[1, -ξ_i π_j + (π_i + π_j) p_k + (ξ_i + ξ_j) x_k, ϵSeries[0]]
```

```
In[•]:=  AllMonomials[{}, 0] = {1};
         AllMonomials[{}, d_Integer] /; d > 0 := {};
         AllMonomials[{v_, vs___}, d_Integer] :=
           Join @@ Table[v^{d-k} AllMonomials[{vs}, k], {k, 0, d}];
         AllMonomials[vs_List, {d_}] := Join @@ Table[AllMonomials[vs, k], {k, 0, d}];
```

```
In[•]:=  Basis[js_List, m_] := Flatten@Outer[Times,
             AllMonomials[Table[p_j, {j, js}], m], AllMonomials[Table[x_j, {j, js}], m]];
         Basis[js_List, {m_}] := Flatten@Table[Basis[js, k], {k, 0, m}]
```

```mathematica
In[•]:=  GenericCombination[bas_, c_] := bas.Table[c_j, {j, Length@bas}];
         GenericCombination[bas_, c__k_] := bas.Table[c_{k,j}, {j, Length@bas}];
```

```mathematica
In[•]:=  R0_{i_,j_} := 𝔼_{{}→{i,j}}[T^{1/2}, (T - 1) (p_i - p_j) x_j , ϵSeries @@ Table[0, $k + 1]];
         Rp_{i_,j_} := 𝔼_{{}→{i,j}}[1, 0,
             ϵSeries @@ Prepend[0]@Table[GenericCombination[Basis[{i, j}, {k + 1}], c_k], {k, $k}]];
         R_{i_,j_} := Module[{i1, j1}, R0_{i,j} Rp_{i1,j1} // m_{i,i1→i} // m_{j,j1→j}];
```

```mathematica
In[•]:=  R̄0_{i_,j_} := 𝔼_{{}→{i,j}}[T^{-1/2}, (T^{-1} - 1) (p_i - p_j) x_j , ϵSeries @@ Table[0, $k + 1]];
         R̄p_{i_,j_} := 𝔼_{{}→{i,j}}[1, 0,
             ϵSeries @@ Prepend[0]@Table[GenericCombination[Basis[{i, j}, {k + 1}], d_k], {k, $k}]];
         R̄_{i_,j_} := Module[{i1, j1}, R̄0_{i,j} R̄p_{i1,j1} // m_{i,i1→i} // m_{j,j1→j}];
```

```mathematica
In[•]:=  C_{i_} := 𝔼_{{}→{i}}[T^{1/2}, 0,
             ϵSeries @@ Prepend[0]@Table[GenericCombination[Basis[{i}, {k + 1}], e_k], {k, $k}]];
         C̄_{i_} := 𝔼_{{}→{i}}[T^{-1/2}, 0,
             ϵSeries @@ Prepend[0]@Table[GenericCombination[Basis[{i}, {k + 1}], f_k], {k, $k}]];
```

In[ ]:= **CF /@ $\{R_{1,2},\ \overline{R}_{1,2},\ C_1,\ \overline{C}_1\}$**

Out[ ]:= $\Big\{\mathbb{E}_{\{\}\to\{1,2\}}\Big[\sqrt{T}\ ,\ (-1+T)\,p_1\,x_2 + (1-T)\,p_2\,x_2,\ \epsilon\mathsf{Series}\Big[0,$

$\qquad c_{1,1} + T\,p_2\,x_1\,c_{1,4} + p_1\,x_1\,(c_{1,2} + c_{1,4} - T\,c_{1,4}) + T\,p_2\,x_2\,c_{1,5} + p_1\,x_2\,(c_{1,3} + c_{1,5} - T\,c_{1,5}) + T^2\,p_2^2\,x_1^2\,c_{1,12} +$

$\qquad p_1\,p_2\,x_1^2\,(T\,c_{1,9} + 2\,T\,c_{1,12} - 2\,T^2\,c_{1,12}) + p_1^2\,x_1^2\,(c_{1,6} + c_{1,9} - T\,c_{1,9} + c_{1,12} - 2\,T\,c_{1,12} + T^2\,c_{1,12}) +$

$\qquad T^2\,p_2^2\,x_1\,x_2\,c_{1,13} + p_1\,p_2\,x_1\,x_2\,(T\,c_{1,10} + 2\,T\,c_{1,13} - 2\,T^2\,c_{1,13}) +$

$\qquad p_1^2\,x_1\,x_2\,(c_{1,7} + c_{1,10} - T\,c_{1,10} + c_{1,13} - 2\,T\,c_{1,13} + T^2\,c_{1,13}) + T^2\,p_2^2\,x_2^2\,c_{1,14} +$

$\qquad p_1\,p_2\,x_2^2\,(T\,c_{1,11} + 2\,T\,c_{1,14} - 2\,T^2\,c_{1,14}) + p_1^2\,x_2^2\,(c_{1,8} + c_{1,11} - T\,c_{1,11} + c_{1,14} - 2\,T\,c_{1,14} + T^2\,c_{1,14})\Big]\Big],$

$\quad \mathbb{E}_{\{\}\to\{1,2\}}\Big[\dfrac{1}{\sqrt{T}}\ ,\ \dfrac{(1-T)\,p_1\,x_2}{T} + \dfrac{(-1+T)\,p_2\,x_2}{T},\ \epsilon\mathsf{Series}\Big[0,$

$\qquad d_{1,1} + \dfrac{p_2\,x_1\,d_{1,4}}{T} + \dfrac{p_1\,x_1\,(T\,d_{1,2} - d_{1,4} + T\,d_{1,4})}{T} + \dfrac{p_2\,x_2\,d_{1,5}}{T} + \dfrac{p_1\,x_2\,(T\,d_{1,3} - d_{1,5} + T\,d_{1,5})}{T} + \dfrac{p_2^2\,x_1^2\,d_{1,12}}{T^2} +$

$\qquad \dfrac{p_1\,p_2\,x_1^2\,(T\,d_{1,9} - 2\,d_{1,12} + 2\,T\,d_{1,12})}{T^2} + \dfrac{p_1^2\,x_1^2\,(T^2\,d_{1,6} - T\,d_{1,9} + T^2\,d_{1,9} + d_{1,12} - 2\,T\,d_{1,12} + T^2\,d_{1,12})}{T^2} +$

$\qquad \dfrac{p_2^2\,x_1\,x_2\,d_{1,13}}{T^2} + \dfrac{p_1\,p_2\,x_1\,x_2\,(T\,d_{1,10} - 2\,d_{1,13} + 2\,T\,d_{1,13})}{T^2} +$

$\qquad \dfrac{p_1^2\,x_1\,x_2\,(T^2\,d_{1,7} - T\,d_{1,10} + T^2\,d_{1,10} + d_{1,13} - 2\,T\,d_{1,13} + T^2\,d_{1,13})}{T^2} +$

$\qquad \dfrac{p_2^2\,x_2^2\,d_{1,14}}{T^2} + \dfrac{p_1\,p_2\,x_2^2\,(T\,d_{1,11} - 2\,d_{1,14} + 2\,T\,d_{1,14})}{T^2} +$

$\qquad \dfrac{p_1^2\,x_2^2\,(T^2\,d_{1,8} - T\,d_{1,11} + T^2\,d_{1,11} + d_{1,14} - 2\,T\,d_{1,14} + T^2\,d_{1,14})}{T^2}\Big]\Big],$

$\quad \mathbb{E}_{\{\}\to\{1\}}\Big[\sqrt{T}\ ,\ 0,\ \epsilon\mathsf{Series}\Big[0,\ e_{1,1} + p_1\,x_1\,e_{1,2} + p_1^2\,x_1^2\,e_{1,3}\Big]\Big],$

$\quad \mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{1}{\sqrt{T}}\ ,\ 0,\ \epsilon\mathsf{Series}\Big[0,\ f_{1,1} + p_1\,x_1\,f_{1,2} + p_1^2\,x_1^2\,f_{1,3}\Big]\Big]\Big\}$

In[ ]:= **RMoves := {**

$\quad (R_{1,2}\,R_{4,3}\,R_{5,6}\ //\ m_{1,4\to1}\ //\ m_{2,5\to2}\ //\ m_{3,6\to3}) \equiv (R_{2,3}\,R_{4,5}\,R_{1,6}\ //\ m_{1,4\to1}\ //\ m_{2,5\to2}\ //\ m_{3,6\to3}),$

$\quad (R_{1,2}\,\overline{R}_{3,4}\ //\ m_{1,3\to1}\ //\ m_{2,4\to2}) \equiv (\eta_1\,\eta_2),$

$\quad (C_1\,\overline{C}_2\ //\ m_{1,2\to1}\ ) \equiv \eta_1,$

$\quad (R_{1,4}\,\overline{R}_{5,2}\,\overline{C}_3\ //\ m_{2,4\to2}\ //\ m_{1,3\to1}\ //\ m_{1,5\to1}) \equiv \overline{C}_1\,\eta_2,$

$\quad (C_3\,R_{1,2}\ //\ m_{2,3\to2}\ //\ m_{2,1\to1}) \equiv (\overline{C}_3\,R_{1,2}\ //\ m_{1,3\to1}\ //\ m_{1,2\to1}),$

$\quad (\overline{C}_2\,R_{1,3}\ //\ m_{1,2\to1}\ //\ m_{1,3\to1}) \equiv \eta_1,\ \ (\overline{C}_2\,\overline{R}_{3,1}\ //\ m_{1,2\to1}\ //\ m_{1,3\to1}) \equiv \eta_1,$

$\quad (C_2\,\overline{R}_{1,3}\ //\ m_{1,2\to1}\ //\ m_{1,3\to1}) \equiv \eta_1,\ (C_2\,R_{3,1}\ //\ m_{1,2\to1}\ //\ m_{1,3\to1}) \equiv \eta_1$

}

In[ ]:= **Short[RMoves, 10]**

Out[ ]//Short=

$\Big\{ 3 c_{1,1} + T p_2 x_1 c_{1,4} + \ll 37 \gg +$

$\quad p_1^2 x_3^2 \big(T^2 c_{1,6} - 2 T^3 c_{1,6} + T^4 c_{1,6} + T c_{1,7} - 2 T^2 c_{1,7} + T^3 c_{1,7} + 2 c_{1,8} - 4 T c_{1,8} + 3 T^2 c_{1,8} + T^2 c_{1,9} -$

$\qquad 3 T^3 c_{1,9} + 3 T^4 c_{1,9} - T^5 c_{1,9} + T c_{1,10} - 3 T^2 c_{1,10} + 3 T^3 c_{1,10} - T^4 c_{1,10} + 2 c_{1,11} - 5 T c_{1,11} +$

$\qquad 5 T^2 c_{1,11} - 2 T^3 c_{1,11} + T^2 c_{1,12} - 4 T^3 c_{1,12} + 6 T^4 c_{1,12} - 4 T^5 c_{1,12} + T^6 c_{1,12} + T c_{1,13} - 4 T^2 c_{1,13} +$

$\qquad 6 T^3 c_{1,13} - 4 T^4 c_{1,13} + T^5 c_{1,13} + 2 c_{1,14} - 6 T c_{1,14} + 8 T^2 c_{1,14} - 6 T^3 c_{1,14} + 2 T^4 c_{1,14} \big) +$

$\quad p_2^2 x_3^2 \big(T^2 c_{1,8} + T^2 c_{1,11} - T^3 c_{1,11} + T^4 c_{1,12} - 2 T^5 c_{1,12} + T^6 c_{1,12} + T^3 c_{1,13} -$

$\qquad 2 T^4 c_{1,13} + T^5 c_{1,13} + 2 T^2 c_{1,14} - 4 T^3 c_{1,14} + 2 T^4 c_{1,14} \big) ==$

$\quad 3 c_{1,1} + T^2 p_3 x_1 c_{1,4} + p_1 x_1 \big(2 c_{1,2} + 2 c_{1,4} - 2 T c_{1,4} \big) + \ll 40 \gg +$

$\quad p_1 p_2 x_3^2 \big(T c_{1,11} - T^2 c_{1,11} + 2 T c_{1,14} - 4 T^2 c_{1,14} + 2 T^3 c_{1,14} \big) +$

$\quad p_2 p_3 x_3^2 \big(T^3 c_{1,11} + 4 T^3 c_{1,14} - 4 T^4 c_{1,14} \big) +$

$\quad p_2^2 x_3^2 \big(T^2 c_{1,8} + T^2 c_{1,11} - T^3 c_{1,11} + 2 T^2 c_{1,14} - 4 T^3 c_{1,14} + 2 T^4 c_{1,14} \big), \; \ll 7 \gg, \; \ll 1 \gg \Big\}$

Solving for R, C, \$k = 1

In[ ]:= **\$k = 1;**

{R$_{1,2}$, C$_1$}

unknowns = Cases[{R$_{1,2}$, $\overline{R}_{1,2}$, C$_1$, $\overline{C}_1$}, (c | d | e | f)$_{\$k,\_}$, ∞] // Union

Out[ ]= $\Big\{ \mathbb{E}_{\{\} \to \{1,2\}} \big[\sqrt{T}, \; (-1 + T) p_1 x_2 + (1 - T) p_2 x_2, \; \in \text{Series} \big[0,$

$\quad c_{1,1} + T p_2 x_1 c_{1,4} + p_1 x_1 (c_{1,2} + c_{1,4} - T c_{1,4}) + T p_2 x_2 c_{1,5} + p_1 x_2 (c_{1,3} + c_{1,5} - T c_{1,5}) + T^2 p_2^2 x_1^2 c_{1,12} +$

$\quad p_1 p_2 x_1^2 \big(T c_{1,9} + 2 T c_{1,12} - 2 T^2 c_{1,12} \big) + p_1^2 x_1^2 \big(c_{1,6} + c_{1,9} - T c_{1,9} + c_{1,12} - 2 T c_{1,12} + T^2 c_{1,12} \big) +$

$\quad T^2 p_2^2 x_1 x_2 c_{1,13} + p_1 p_2 x_1 x_2 \big(T c_{1,10} + 2 T c_{1,13} - 2 T^2 c_{1,13} \big) +$

$\quad p_1^2 x_1 x_2 \big(c_{1,7} + c_{1,10} - T c_{1,10} + c_{1,13} - 2 T c_{1,13} + T^2 c_{1,13} \big) + T^2 p_2^2 x_2^2 c_{1,14} +$

$\quad p_1 p_2 x_2^2 \big(T c_{1,11} + 2 T c_{1,14} - 2 T^2 c_{1,14} \big) + p_1^2 x_2^2 \big(c_{1,8} + c_{1,11} - T c_{1,11} + c_{1,14} - 2 T c_{1,14} + T^2 c_{1,14} \big) \big] \big],$

$\quad \mathbb{E}_{\{\} \to \{1\}} \big[\sqrt{T}, \; 0, \; \in \text{Series} \big[0, \; e_{1,1} + p_1 x_1 e_{1,2} + p_1^2 x_1^2 e_{1,3} \big] \big] \Big\}$

Out[ ]= $\{ c_{1,1}, c_{1,2}, c_{1,3}, c_{1,4}, c_{1,5}, c_{1,6}, c_{1,7}, c_{1,8}, c_{1,9}, c_{1,10}, c_{1,11}, c_{1,12}, c_{1,13}, c_{1,14}, d_{1,1}, d_{1,2}, d_{1,3},$

$\quad d_{1,4}, d_{1,5}, d_{1,6}, d_{1,7}, d_{1,8}, d_{1,9}, d_{1,10}, d_{1,11}, d_{1,12}, d_{1,13}, d_{1,14}, e_{1,1}, e_{1,2}, e_{1,3}, f_{1,1}, f_{1,2}, f_{1,3} \}$

$In[\circ]:=$ **Short[errors = CCF /@ Cases[RMoves, $a\_ == b\_ \mapsto a - b$], 25]**

$Out[\circ]//Short=$

$\{ T p_1 x_3 c_{1,2} - T^2 p_1 x_3 c_{1,2} + p_1 x_3 c_{1,3} - T p_1 x_3 c_{1,3} - T p_2 x_1 c_{1,4} + T^2 p_2 x_1 c_{1,4} + T p_3 x_1 c_{1,4} - T^2 p_3 x_1 c_{1,4} +$

$T p_1 x_2 c_{1,4} - T^2 p_1 x_2 c_{1,4} - T p_2 x_2 c_{1,4} + 2 T^2 p_2 x_2 c_{1,4} - T^3 p_2 x_2 c_{1,4} - T^2 p_3 x_2 c_{1,4} + T^3 p_3 x_2 c_{1,4} +$

$T p_1 x_3 c_{1,4} - 2 T^2 p_1 x_3 c_{1,4} + T^3 p_1 x_3 c_{1,4} + T^2 p_2 x_3 c_{1,4} - T^3 p_2 x_3 c_{1,4} + p_1 x_3 c_{1,5} - T p_1 x_3 c_{1,5} -$

$2 p_1^2 x_1 x_2 c_{1,6} + 2 T p_1^2 x_1 x_2 c_{1,6} + 2 T p_1 p_2 x_2^2 c_{1,6} - 2 T^2 p_1 p_2 x_2^2 c_{1,6} + 2 T p_1^2 x_1 x_3 c_{1,6} - 2 T^2 p_1^2 x_1 x_3 c_{1,6} +$

$T^2 p_1^2 x_3^2 c_{1,6} - 2 T^3 p_1^2 x_3^2 c_{1,6} + T^4 p_1^2 x_3^2 c_{1,6} + 2 T p_1 p_2 x_2 x_3 c_{1,7} - 2 T^2 p_1 p_2 x_2 x_3 c_{1,7} + T p_1^2 x_3^2 c_{1,7} -$

$2 T^2 p_1^2 x_3^2 c_{1,7} + T^3 p_1^2 x_3^2 c_{1,7} + 2 p_1^2 x_2 x_3 c_{1,8} - 2 T p_1^2 x_2 x_3 c_{1,8} + p_1^2 x_3^2 c_{1,8} - 4 T p_1^2 x_3^2 c_{1,8} +$

$3 T^2 p_1^2 x_3^2 c_{1,8} + 2 T p_1 p_2 x_3^2 c_{1,8} - 2 T^2 p_1 p_2 x_3^2 c_{1,8} - T p_1 p_2 x_1^2 c_{1,9} + T^2 p_1 p_2 x_1^2 c_{1,9} + \ll 212 \gg +$

$4 T^4 p_1 p_2 x_2 x_3 c_{1,13} - T^2 p_2^2 x_2 x_3 c_{1,13} + 4 T^3 p_2^2 x_2 x_3 c_{1,13} - 4 T^4 p_2^2 x_2 x_3 c_{1,13} + T^5 p_2^2 x_2 x_3 c_{1,13} +$

$2 T^3 p_1 p_3 x_2 x_3 c_{1,13} - 2 T^4 p_1 p_3 x_2 x_3 c_{1,13} - 2 T^3 p_2 p_3 x_2 x_3 c_{1,13} + 4 T^4 p_2 p_3 x_2 x_3 c_{1,13} -$

$2 T^5 p_2 p_3 x_2 x_3 c_{1,13} - T^4 p_3^2 x_2 x_3 c_{1,13} + T^5 p_3^2 x_2 x_3 c_{1,13} + T p_1^2 x_3^2 c_{1,13} - 4 T^2 p_1^2 x_3^2 c_{1,13} +$

$6 T^3 p_1^2 x_3^2 c_{1,13} - 4 T^4 p_1^2 x_3^2 c_{1,13} + T^5 p_1^2 x_3^2 c_{1,13} + 2 T^2 p_1 p_2 x_3^2 c_{1,13} - 6 T^3 p_1 p_2 x_3^2 c_{1,13} +$

$6 T^4 p_1 p_2 x_3^2 c_{1,13} - 2 T^5 p_1 p_2 x_3^2 c_{1,13} + T^3 p_2^2 x_3^2 c_{1,13} - 2 T^4 p_2^2 x_3^2 c_{1,13} + T^5 p_2^2 x_3^2 c_{1,13} + 2 p_1^2 x_2 x_3 c_{1,14} -$

$6 T p_1^2 x_2 x_3 c_{1,14} + 6 T^2 p_1^2 x_2 x_3 c_{1,14} - 2 T^3 p_1^2 x_2 x_3 c_{1,14} + 4 T p_1 p_2 x_2 x_3 c_{1,14} - 8 T^2 p_1 p_2 x_2 x_3 c_{1,14} +$

$4 T^3 p_1 p_2 x_2 x_3 c_{1,14} + 2 T^2 p_2^2 x_2 x_3 c_{1,14} - 2 T^3 p_2^2 x_2 x_3 c_{1,14} + p_1^2 x_3^2 c_{1,14} - 4 T p_1^2 x_3^2 c_{1,14} + 7 T^2 p_1^2 x_3^2 c_{1,14} -$

$6 T^3 p_1^2 x_3^2 c_{1,14} + 2 T^4 p_1^2 x_3^2 c_{1,14} + 2 T p_1 p_2 x_3^2 c_{1,14} - 6 T^2 p_1 p_2 x_3^2 c_{1,14} + 6 T^3 p_1 p_2 x_3^2 c_{1,14} -$

$2 T^4 p_1 p_2 x_3^2 c_{1,14} + 2 T^3 p_1 p_3 x_3^2 c_{1,14} - 2 T^4 p_1 p_3 x_3^2 c_{1,14} - 2 T^3 p_2 p_3 x_3^2 c_{1,14} + 2 T^4 p_2 p_3 x_3^2 c_{1,14},$

$\dfrac{T^2 c_{\ll 1 \gg} + \ll 154 \gg + \ll 1 \gg}{T^2}, \ \ll 1 \gg, \ \ll 3 \gg, \ d_{\ll 1 \gg} + \ll 54 \gg + \ll 1 \gg,$

$\dfrac{\ll 1 \gg}{T^2}, \ \dfrac{T^2 c_{1,1} + \ll 54 \gg + p_1^2 x_1^2 e_{1,3}}{T^2} \}$

$In[\circ]:=$ **Short[**
eqns =
Thread[0 == Union @@ (CoefficientRules[#, $\{x_1, x_2, x_3, p_1, p_2, p_3\}$][[;; , 2]] & /@ errors)],
10]

$Out[\circ]//Short=$

$\{0 == T c_{1,4} - T^2 c_{1,4}, \ 0 == -T c_{1,4} + T^2 c_{1,4}, \ 0 == T^2 c_{1,4} - T^3 c_{1,4},$

$0 == -T c_{1,4} + 2 T^2 c_{1,4} - T^3 c_{1,4}, \ 0 == -T^2 c_{1,4} + T^3 c_{1,4}, \ \ll 74 \gg,$

$0 == c_{1,6} - T^2 c_{1,6} + \dfrac{c_{1,7}}{T} - T c_{1,7} - c_{1,8} + \dfrac{c_{1,8}}{T^2} + c_{1,9} - T^2 c_{1,9} + \dfrac{c_{1,10}}{T} - T c_{1,10} -$

$c_{1,11} + \dfrac{c_{1,11}}{T^2} + c_{1,12} - T^2 c_{1,12} + \dfrac{c_{1,13}}{T} - T c_{1,13} - c_{1,14} + \dfrac{c_{1,14}}{T^2} + \dfrac{e_{1,3}}{T^2} - T^2 f_{1,3},$

$0 == T^2 c_{1,6} + T c_{1,7} + c_{1,8} + T^2 c_{1,9} + T c_{1,10} + c_{1,11} + T^2 c_{1,12} + T c_{1,13} + c_{1,14} + T^2 f_{1,3},$

$0 == d_{1,6} + T d_{1,7} + T^2 d_{1,8} + d_{1,9} + T d_{1,10} + T^2 d_{1,11} + d_{1,12} + T d_{1,13} + T^2 d_{1,14} + T^2 f_{1,3},$

$0 == c_{1,6} - 2 T c_{1,6} + T^2 c_{1,6} - c_{1,7} + T c_{1,7} + c_{1,8} + T^2 d_{1,8} - T d_{1,11} + T^2 d_{1,11} + d_{1,14} - 2 T d_{1,14} +$

$T^2 d_{1,14} + f_{1,3} - 2 T f_{1,3} + T^2 f_{1,3}, \ 0 == d_{1,1} - T d_{1,3} + d_{1,5} - T d_{1,5} + 2 T^2 d_{1,8} - 2 T d_{1,11} +$

$2 T^2 d_{1,11} + 2 d_{1,14} - 4 T d_{1,14} + 2 T^2 d_{1,14} + f_{1,1} + f_{1,2} - T f_{1,2} + 2 f_{1,3} - 4 T f_{1,3} + 2 T^2 f_{1,3} \}$

$In[\circ]:=$ **{sol} = Solve[eqns, unknowns]**

Solve: Equations may not give solutions for all "solve" variables.

$Out[\circ]=$ $\left\{\left\{c_{1,1} \to -\frac{c_{1,2}}{2} - \frac{c_{1,5}}{2}, \; c_{1,3} \to -T\,c_{1,2} - c_{1,5}, \; c_{1,4} \to 0, \; c_{1,6} \to 0, \; c_{1,7} \to -\frac{1}{2}(1+T)\,c_{1,10} - c_{1,11},\right.\right.$

$c_{1,8} \to -\frac{1}{2}(T - T^2)\,c_{1,10} - (1-T)\,c_{1,11}, \; c_{1,9} \to 0, \; c_{1,12} \to 0, \; c_{1,13} \to 0, \; c_{1,14} \to 0,$

$d_{1,1} \to \frac{c_{1,2}}{2} + \frac{c_{1,5}}{2}, \; d_{1,2} \to -c_{1,2}, \; d_{1,3} \to \frac{c_{1,2}}{T} + c_{1,5}, \; d_{1,4} \to 0, \; d_{1,5} \to -c_{1,5}, \; d_{1,6} \to 0,$

$d_{1,7} \to -\frac{(1-3T)\,c_{1,10}}{2T} + \frac{c_{1,11}}{T}, \; d_{1,8} \to -\frac{(-1+3T-2T^2)\,c_{1,10}}{2T^2} - \frac{(1-T)\,c_{1,11}}{T^2}, \; d_{1,9} \to 0,$

$d_{1,10} \to -c_{1,10}, \; d_{1,11} \to -\frac{(-1+T)\,c_{1,10}}{T} - \frac{c_{1,11}}{T}, \; d_{1,12} \to 0, \; d_{1,13} \to 0, \; d_{1,14} \to 0,$

$\left.\left.e_{1,1} \to -\frac{c_{1,2}}{2} - \frac{c_{1,5}}{2}, \; e_{1,2} \to -c_{1,10}, \; e_{1,3} \to 0, \; f_{1,1} \to \frac{c_{1,2}}{2} + \frac{c_{1,5}}{2}, \; f_{1,2} \to c_{1,10}, \; f_{1,3} \to 0\right\}\right\}$

$In[\circ]:=$ **sol /. $(a\_ \to b\_) :\to (a = b)$**

$Out[\circ]=$ $\left\{-\frac{c_{1,2}}{2} - \frac{c_{1,5}}{2}, \; -T\,c_{1,2} - c_{1,5}, \; 0, \; 0, \; -\frac{1}{2}(1+T)\,c_{1,10} - c_{1,11},\right.$

$-\frac{1}{2}(T-T^2)\,c_{1,10} - (1-T)\,c_{1,11}, \; 0, \; 0, \; 0, \; 0, \; \frac{c_{1,2}}{2} + \frac{c_{1,5}}{2}, \; -c_{1,2}, \; \frac{c_{1,2}}{T} + c_{1,5}, \; 0,$

$-c_{1,5}, \; 0, \; -\frac{(1-3T)\,c_{1,10}}{2T} + \frac{c_{1,11}}{T}, \; -\frac{(-1+3T-2T^2)\,c_{1,10}}{2T^2} - \frac{(1-T)\,c_{1,11}}{T^2}, \; 0, \; -c_{1,10},$

$-\frac{(-1+T)\,c_{1,10}}{T} - \frac{c_{1,11}}{T}, \; 0, \; 0, \; 0, \; -\frac{c_{1,2}}{2} - \frac{c_{1,5}}{2}, \; -c_{1,10}, \; 0, \; \frac{c_{1,2}}{2} + \frac{c_{1,5}}{2}, \; c_{1,10}, \; 0\right\}$

$In[\circ]:=$ **CF /@ $\left\{Rp_{1,2}, \overline{Rp}_{1,2}, C_1, \overline{C}_1\right\}$**

$Out[\circ]=$ $\left\{\mathbb{E}_{\{\} \to \{1,2\}}\left[1, \; 0,\right.\right.$

$\epsilon\,\mathrm{Series}\left[0, \; p_1\,x_1\,c_{1,2} + \frac{1}{2}(-c_{1,2} - c_{1,5}) + p_1\,x_2\,(-T\,c_{1,2} - c_{1,5}) + p_2\,x_2\,c_{1,5} + p_1\,p_2\,x_1\,x_2\,c_{1,10} + \frac{1}{2}\,p_1^2\,x_1\right.$

$\left.\left.x_2\,(-c_{1,10} - T\,c_{1,10} - 2\,c_{1,11}) + p_1\,p_2\,x_2^2\,c_{1,11} + \frac{1}{2}\,p_1^2\,x_2^2\,(-T\,c_{1,10} + T^2\,c_{1,10} - 2\,c_{1,11} + 2\,T\,c_{1,11})\right]\right],$

$\mathbb{E}_{\{\} \to \{1,2\}}\left[1, \; 0, \; \epsilon\,\mathrm{Series}\left[0, \; -p_1\,x_1\,c_{1,2} - p_2\,x_2\,c_{1,5} + \frac{1}{2}(c_{1,2} + c_{1,5}) + \frac{p_1\,x_2\,(c_{1,2} + T\,c_{1,5})}{T}\right.\right.$

$- p_1\,p_2\,x_1\,x_2\,c_{1,10} + \frac{p_1\,p_2\,x_2^2\,(c_{1,10} - T\,c_{1,10} - c_{1,11})}{T} + \frac{p_1^2\,x_1\,x_2\,(-c_{1,10} + 3\,T\,c_{1,10} + 2\,c_{1,11})}{2T} +$

$\left.\left.\frac{p_1^2\,x_2^2\,(c_{1,10} - 3\,T\,c_{1,10} + 2\,T^2\,c_{1,10} - 2\,c_{1,11} + 2\,T\,c_{1,11})}{2T^2}\right]\right],$

$\mathbb{E}_{\{\} \to \{1\}}\left[\sqrt{T}, \; 0, \; \epsilon\,\mathrm{Series}\left[0, \; \frac{1}{2}(-c_{1,2} - c_{1,5}) - p_1\,x_1\,c_{1,10}\right]\right],$

$\left.\mathbb{E}_{\{\} \to \{1\}}\left[\frac{1}{\sqrt{T}}, \; 0, \; \epsilon\,\mathrm{Series}\left[0, \; \frac{1}{2}(c_{1,2} + c_{1,5}) + p_1\,x_1\,c_{1,10}\right]\right]\right\}$

$In[\bullet]:=$ **Factor /@ CF[Last@ZF@Knot[6, 1] - Last@ZF@Knot[9, 46]]**

$Out[\bullet]=$ $\epsilon \text{Series}\left[0, \dfrac{2 (-1+T)^2 (1-4T+T^2) c_{1,10}}{(-2+T)^2 (-1+2T)^2}\right]$

$In[\bullet]:=$ **Cases$\left[\left\{Rp_{1,2}, \overline{Rp}_{1,2}, C_1, \overline{C}_1\right\}, (c\,|\,d\,|\,e\,|\,f)_{\$k,\_}, \infty\right]$ // Union**

$Out[\bullet]=$ $\{c_{1,2}, c_{1,5}, c_{1,10}, c_{1,11}\}$

$In[\bullet]:=$ **CF /@ $\left(\left\{Rp_{1,2}, \overline{Rp}_{1,2}, C_1, \overline{C}_1\right\} /. \{c_{1,10} \to -1/2, c_{1,2} \to 0, c_{1,5} \to 0\}\right)$**

$Out[\bullet]=$ $\Big\{ \mathbb{E}_{\{\}\to\{1,2\}}\Big[1, 0, \epsilon \text{Series}\Big[0,$

$\qquad -\dfrac{1}{2} p_1 p_2 x_1 x_2 + \dfrac{1}{4} p_1^2 x_1 x_2 (1+T-4c_{1,11}) + p_1 p_2 x_2^2 c_{1,11} + \dfrac{1}{4} p_1^2 x_2^2 (T-T^2-4c_{1,11}+4Tc_{1,11})\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1,2\}}\Big[1, 0, \epsilon \text{Series}\Big[0, \dfrac{1}{2} p_1 p_2 x_1 x_2 + \dfrac{p_1 p_2 x_2^2 (-1+T-2c_{1,11})}{2T} +$

$\qquad \dfrac{p_1^2 x_1 x_2 (1-3T+4c_{1,11})}{4T} + \dfrac{p_1^2 x_2^2 (-1+3T-2T^2-4c_{1,11}+4Tc_{1,11})}{4T^2}\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1\}}\Big[\sqrt{T}, 0, \epsilon \text{Series}\Big[0, \dfrac{p_1 x_1}{2}\Big]\Big], \mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{1}{\sqrt{T}}, 0, \epsilon \text{Series}\Big[0, -\dfrac{1}{2} p_1 x_1\Big]\Big]\Big\}$

$In[\bullet]:=$ **CF /@ $\left(\left\{Rp_{1,2}, \overline{Rp}_{1,2}, C_1, \overline{C}_1\right\} /. \{c_{1,10} \to -1/2, c_{1,2} \to 0, c_{1,5} \to 0, c_{1,11} \to T/2\}\right)$**

$Out[\bullet]=$ $\Big\{ \mathbb{E}_{\{\}\to\{1,2\}}\Big[1, 0, \epsilon \text{Series}\Big[0, \dfrac{1}{4} (1-T) p_1^2 x_1 x_2 - \dfrac{1}{2} p_1 p_2 x_1 x_2 + \dfrac{1}{4} (-T+T^2) p_1^2 x_2^2 + \dfrac{1}{2} T p_1 p_2 x_2^2\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1,2\}}\Big[1, 0, \epsilon \text{Series}\Big[0, \dfrac{(1-T) p_1^2 x_1 x_2}{4T} + \dfrac{1}{2} p_1 p_2 x_1 x_2 + \dfrac{(-1+T) p_1^2 x_2^2}{4T^2} - \dfrac{p_1 p_2 x_2^2}{2T}\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1\}}\Big[\sqrt{T}, 0, \epsilon \text{Series}\Big[0, \dfrac{p_1 x_1}{2}\Big]\Big], \mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{1}{\sqrt{T}}, 0, \epsilon \text{Series}\Big[0, -\dfrac{1}{2} p_1 x_1\Big]\Big]\Big\}$

$In[\bullet]:=$ **$\{c_{1,10} = -1/2, c_{1,2} = 0, c_{1,5} = 0, c_{1,11} = T/2\};$**
CF /@ $\left\{R_{1,2}, \overline{R}_{1,2}, C_1, \overline{C}_1\right\}$

$Out[\bullet]=$ $\Big\{ \mathbb{E}_{\{\}\to\{1,2\}}\Big[\sqrt{T}, (-1+T) p_1 x_2 + (1-T) p_2 x_2,$

$\qquad \epsilon \text{Series}\Big[0, \dfrac{1}{4} (-1+T) p_1^2 x_1 x_2 - \dfrac{1}{2} T p_1 p_2 x_1 x_2 + \dfrac{1}{4} (T-T^2) p_1^2 x_2^2 + \dfrac{1}{2} T^2 p_1 p_2 x_2^2\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1,2\}}\Big[\dfrac{1}{\sqrt{T}}, \dfrac{(1-T) p_1 x_2}{T} + \dfrac{(-1+T) p_2 x_2}{T},$

$\qquad \epsilon \text{Series}\Big[0, \dfrac{(-1+T) p_1^2 x_1 x_2}{4T} + \dfrac{p_1 p_2 x_1 x_2}{2T} + \dfrac{(1-T) p_1^2 x_2^2}{4T^2} - \dfrac{p_1 p_2 x_2^2}{2T^2}\Big]\Big],$

$\qquad \mathbb{E}_{\{\}\to\{1\}}\Big[\sqrt{T}, 0, \epsilon \text{Series}\Big[0, \dfrac{p_1 x_1}{2}\Big]\Big], \mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{1}{\sqrt{T}}, 0, \epsilon \text{Series}\Big[0, -\dfrac{1}{2} p_1 x_1\Big]\Big]\Big\}$

In[●]:= $\mathbf{CF}\left[\mathbf{R_{1,2}} \ /. \ \mathbf{T} \to \mathbf{T^{-1}}\right]$

Out[●]= $\mathbb{E}_{\{\}\to\{1,2\}}\left[\sqrt{\dfrac{1}{T}}, \ \dfrac{(1-T)\ p_1\ x_2}{T} + \dfrac{(-1+T)\ p_2\ x_2}{T},\right.$

$\left. \in\mathsf{Series}\left[0, \ \dfrac{(1-T)\ p_1^2\ x_1\ x_2}{4\ T} - \dfrac{p_1\ p_2\ x_1\ x_2}{2\ T} + \dfrac{(-1+T)\ p_1^2\ x_2^2}{4\ T^2} + \dfrac{p_1\ p_2\ x_2^2}{2\ T^2}\right]\right]$

In[●]:= **RMoves**

Out[●]= {True, True, True, True, True, True, True, True, True}

The isomorphism with Γ-calculus

In[●]:= $\Gamma\left[\mathbb{E}_{\{\}\to is\_}[\omega\_, \ Q\_, \ \_]\right] := \mathbf{CF@}\Gamma\left[\omega^{-1}, \ \mathsf{Sum}[p_i\ x_i, \{i, is\}] - Q\right]$

$\mathbb{E}[\Gamma[\omega\_, \ A\_]] := \mathsf{Module}\left[\{is = \mathsf{Union@Cases}[A, \ p_{i\_} \Rrightarrow i, \ \infty]\},\right.$

$\left.\quad \mathbf{CF@}\mathbb{E}_{\{\}\to is}\left[\omega^{-1}, \ \mathsf{Sum}[p_i\ x_i, \{i, is\}] - A, \ \in\mathsf{Series}[0]\right]\right]$

In[●]:= $\left\{R_{i,j}, \ R_{i,j}\ //\ \Gamma, \ R_{i,j}\ //\ \Gamma\ //\ \mathbb{E}\right\}\ //\ \mathsf{Column}$

Out[●]=

$\mathbb{E}_{\{\}\to\{i,j\}}\left[\sqrt{T}, \ (-1+T)\ p_i\ x_j + (1-T)\ p_j\ x_j,\right.$

$\left.\quad \in\mathsf{Series}\left[0, \ \tfrac{1}{4}\ (-1+T)\ p_i^2\ x_i\ x_j - \tfrac{1}{2}\ T\ p_i\ p_j\ x_i\ x_j + \tfrac{1}{4}\ (T-T^2)\ p_i^2\ x_j^2 + \tfrac{1}{2}\ T^2\ p_i\ p_j\ x_j^2\right]\right]$

$\Gamma\left[\dfrac{1}{\sqrt{T}}, \ p_i\ x_i + (1-T)\ p_i\ x_j + T\ p_j\ x_j\right]$

$\mathbb{E}_{\{\}\to\{i,j\}}\left[\sqrt{T}, \ (-1+T)\ p_i\ x_j + (1-T)\ p_j\ x_j, \ \in\mathsf{Series}[0, 0]\right]$

In[●]:= $\boldsymbol{\gamma\mathbf{1}} = \Gamma\left[\omega, \ \{x_i, x_j, x_r\}.\begin{pmatrix}\alpha & \beta & \Theta \\ \gamma & \delta & \in \\ \phi & \psi & \Xi\end{pmatrix}.\{p_i, p_j, p_r\}\right]\ //\ \mathbb{E}$

Out[●]= $\mathbb{E}_{\{\}\to\{i,j,r\}}\left[\dfrac{1}{\omega}, \ (1-\alpha)\ p_i\ x_i - \beta\ p_j\ x_i - \Theta\ p_r\ x_i - \gamma\ p_i\ x_j +\right.$

$\left.\quad (1-\delta)\ p_j\ x_j - \in\ p_r\ x_j - \phi\ p_i\ x_r - \psi\ p_j\ x_r + (1-\Xi)\ p_r\ x_r, \ \in\mathsf{Series}[0, 0]\right]$

In[●]:= $\boldsymbol{\gamma\mathbf{1}}\ //\ \mathbf{m}_{i,j\to k}\ //\ \Gamma$

» $\dfrac{1}{\sqrt{1 - 2\ \beta + \beta^2}\ \omega}$

» $\dfrac{1}{(-1+\beta)\ \omega}$

Out[●]= $\Gamma\left[-\omega + \beta\ \omega,\right.$

$\left.\dfrac{(-\gamma + \beta\ \gamma - \alpha\ \delta)\ p_k\ x_k}{-1+\beta} + \dfrac{(-\in + \beta\ \in - \delta\ \Theta)\ p_r\ x_k}{-1+\beta} + \dfrac{(-\phi + \beta\ \phi - \alpha\ \psi)\ p_k\ x_r}{-1+\beta} + \dfrac{(-\Xi + \beta\ \Xi - \Theta\ \psi)\ p_r\ x_r}{-1+\beta}\right]$

$In[\bullet]:=$ **Simplify**$\Big[$

$\Big(\mathbb{E} @ \Gamma \Big[\omega, \{x_1, x_2, x_3\} . \begin{pmatrix} \alpha & \beta & \gamma \\ \delta & \epsilon & \eta \\ \lambda & \mu & \nu \end{pmatrix} . \{p_1, p_2, p_3\} \Big] \, \mathbb{E}_{\{\} \to \{i,j\}} [1, 0, \epsilon \text{Series}[0, p_i\, x_i]] \, // \, m_{1,i\to1} \, //$

$m_{1,2\to1} \, // \, m_{1,j\to1} \, // \, m_{1,3\to1} \Big) [\![3, 2]\!] \, /. \, (x \mid p)_- \to 0 \Big]$

$Out[\bullet]=$ $\dfrac{\beta + \gamma\, \epsilon - \beta\, \eta}{-1 + \beta + \gamma\, \epsilon + \eta - \beta\, \eta}$

$In[\bullet]:=$ **Simplify**$\Big[$

$\Big(\mathbb{E} @ \Gamma \Big[\omega, \{x_1, x_2, x_3\} . \begin{pmatrix} \alpha & \beta & \gamma \\ \delta & \epsilon & \eta \\ \lambda & \mu & \nu \end{pmatrix} . \{p_1, p_2, p_3\} \Big] \, \mathbb{E}_{\{\} \to \{i,j\}} \Big[1, 0, \epsilon \text{Series}\Big[0, p_i\, x_j\Big] \Big] \, // \, m_{1,i\to1} \, //$

$m_{1,2\to1} \, // \, m_{1,j\to1} \, // \, m_{1,3\to1} \Big) [\![3, 2]\!] \, /. \, (x \mid p)_- \to 0 \Big]$

$Out[\bullet]=$ $\dfrac{\gamma}{-1 + \beta + \gamma\, \epsilon + \eta - \beta\, \eta}$

$In[\bullet]:=$ **Simplify**$\Big[$

$\Big(\mathbb{E} @ \Gamma \Big[\omega, \{x_1, x_2, x_3\} . \begin{pmatrix} \alpha & \beta & \gamma \\ \delta & \epsilon & \eta \\ \lambda & \mu & \nu \end{pmatrix} . \{p_1, p_2, p_3\} \Big] \, \mathbb{E}_{\{\} \to \{i,j\}} \Big[1, 0, \epsilon \text{Series}\Big[0, p_j\, x_i\Big] \Big] \, // \, m_{1,i\to1} \, //$

$m_{1,2\to1} \, // \, m_{1,j\to1} \, // \, m_{1,3\to1} \Big) [\![3, 2]\!] \, /. \, (x \mid p)_- \to 0 \Big]$

$Out[\bullet]=$ $\dfrac{\epsilon}{-1 + \beta + \gamma\, \epsilon + \eta - \beta\, \eta}$

$In[\bullet]:=$ **Simplify**$\Big[$

$\Big(\mathbb{E} @ \Gamma \Big[\omega, \{x_1, x_2, x_3\} . \begin{pmatrix} \alpha & \beta & \gamma \\ \delta & \epsilon & \eta \\ \lambda & \mu & \nu \end{pmatrix} . \{p_1, p_2, p_3\} \Big] \, \mathbb{E}_{\{\} \to \{i,j\}} \Big[1, 0, \epsilon \text{Series}\Big[0, p_j\, x_j\Big] \Big] \, // \, m_{1,i\to1} \, //$

$m_{1,2\to1} \, // \, m_{1,j\to1} \, // \, m_{1,3\to1} \Big) [\![3, 2]\!] \, /. \, (x \mid p)_- \to 0 \Big]$

$Out[\bullet]=$ $\dfrac{\gamma\, \epsilon + \eta - \beta\, \eta}{-1 + \beta + \gamma\, \epsilon + \eta - \beta\, \eta}$

$In[\bullet]:=$ C_i

$Out[\bullet]=$ $\mathbb{E}_{\{\} \to \{i\}} \Big[\sqrt{T}, 0, \epsilon \text{Series}\Big[0, \dfrac{p_i\, x_i}{2} \Big] \Big]$

$In[\circ]:=$ **CF$\left[\overline{Rp}_{i,j} \text{ /. } T \to T^{-1}\right]$**

$Out[\circ]=$ $\mathbb{E}_{\{\}\to\{i,j\}}\left[1, 0, \epsilon\text{Series}\left[0, \frac{1}{4}(-1+T)\,p_i^2\,x_i\,x_j + \frac{1}{2}\,p_i\,p_j\,x_i\,x_j + \frac{1}{4}\left(T - T^2\right)p_i^2\,x_j^2 - \frac{1}{2}\,T\,p_i\,p_j\,x_j^2\right]\right]$

$In[\circ]:=$ **CF$\left[Rp_{i,j}\right]$**

$Out[\circ]=$ $\mathbb{E}_{\{\}\to\{i,j\}}\left[1, 0, \epsilon\text{Series}\left[0, \frac{1}{4}(1-T)\,p_i^2\,x_i\,x_j - \frac{1}{2}\,p_i\,p_j\,x_i\,x_j + \frac{1}{4}\left(-T + T^2\right)p_i^2\,x_j^2 + \frac{1}{2}\,T\,p_i\,p_j\,x_j^2\right]\right]$

$In[\circ]:=$ **Simplify$\left[\frac{1}{4}(1-T)\,p_i^2\,x_i\,x_j - \frac{1}{2}\,p_i\,p_j\,x_i\,x_j + \frac{1}{4}\left(-T + T^2\right)p_i^2\,x_j^2 + \frac{1}{2}\,T\,p_i\,p_j\,x_j^2\right]$**

$Out[\circ]=$ $\frac{1}{4}\,p_i\left((-1+T)\,p_i + 2\,p_j\right)x_j\left(-x_i + T\,x_j\right)$

$In[\circ]:=$ **Simplify$\Big[$**

$\left(\mathbb{E}@\Gamma\left[\omega, \{x_1, x_2, x_3\}.\begin{pmatrix}\alpha & \beta & \gamma\\ \delta & \epsilon & \eta\\ \lambda & \mu & \nu\end{pmatrix}.\{p_1, p_2, p_3\}\right]\mathbb{E}_{\{\}\to\{i,j\}}\left[1, 0, \epsilon\text{Series}\left[0, p_i^2\,x_i\,x_j\right]\right] \text{ // } m_{1,i\to1} \text{ //}\right.$

$\left.m_{1,2\to1} \text{ // } m_{1,j\to1} \text{ // } m_{1,3\to1}\right)[[3, 2]] \text{ /. } (x \mid p)\_ \to 0\Big]$

$Out[\circ]=$ $\dfrac{2\,\gamma\,(\beta + \gamma\,\epsilon - \beta\,\eta)}{\left(-1 + \beta + \gamma\,\epsilon + \eta - \beta\,\eta\right)^2}$

$In[\circ]:=$ **Simplify$\Big[$**

$\left(\mathbb{E}@\Gamma\left[\omega, \{x_1, x_2, x_3\}.\begin{pmatrix}\alpha & \beta & \gamma\\ \delta & \epsilon & \eta\\ \lambda & \mu & \nu\end{pmatrix}.\{p_1, p_2, p_3\}\right]\mathbb{E}_{\{\}\to\{i,j\}}\left[1, 0, \epsilon\text{Series}\left[0, p_j\,x_j\right]\right] \text{ // } m_{1,i\to1} \text{ //}\right.$

$\left.m_{1,2\to1} \text{ // } m_{1,j\to1} \text{ // } m_{1,3\to1}\right)[[3, 2]] \text{ /. } (x \mid p)\_ \to 0\Big]$

$In[\circ]:=$ **$\mathbb{E}@\Gamma\left[\omega, \{x_1, x_2, x_3\}.\begin{pmatrix}\alpha & \beta & \gamma\\ \delta & \epsilon & \eta\\ \lambda & \mu & \nu\end{pmatrix}.\{p_1, p_2, p_3\}\right]Rp_{i,j} \text{ // } m_{1,i\to1} \text{ // } m_{1,2\to1} \text{ // } m_{1,j\to1} \text{ // } m_{1,3\to1}$**

$Out[\circ]=$ $\mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{1}{\omega - \beta\,\omega - \gamma\,\epsilon\,\omega - \eta\,\omega + \beta\,\eta\,\omega},$

$\dfrac{(1 - \beta - \gamma\,\epsilon - \eta + \beta\,\eta - \lambda + \beta\,\lambda + \gamma\,\epsilon\,\lambda + \eta\,\lambda - \beta\,\eta\,\lambda - \alpha\,\mu - \gamma\,\delta\,\mu + \alpha\,\eta\,\mu - \delta\,\nu + \beta\,\delta\,\nu - \alpha\,\epsilon\,\nu)\,p_1\,x_1}{1 - \beta - \gamma\,\epsilon - \eta + \beta\,\eta},$

$\epsilon\text{Series}\Big[0,\left(\beta\,\gamma - T\,\beta\,\gamma - T\,\gamma^2 + T^2\,\gamma^2 - \gamma\,\epsilon - \beta\,\gamma\,\epsilon + \gamma^2\,\epsilon + T\,\gamma^2\,\epsilon - \gamma^2\,\epsilon^2 - \beta\,\eta + \beta^2\,\eta + \right.$

$2\,T\,\gamma\,\eta - \beta\,\gamma\,\eta - T\,\beta\,\gamma\,\eta - \gamma\,\epsilon\,\eta + 2\,\beta\,\gamma\,\epsilon\,\eta + \beta\,\eta^2 - \beta^2\,\eta^2\Big) \big/ \left(2 - 4\,\beta + 2\,\beta^2 - 4\,\gamma\,\epsilon + \right.$

$4\,\beta\,\gamma\,\epsilon + 2\,\gamma^2\,\epsilon^2 - 4\,\eta + 8\,\beta\,\eta - 4\,\beta^2\,\eta + 4\,\gamma\,\epsilon\,\eta - 4\,\beta\,\gamma\,\epsilon\,\eta + 2\,\eta^2 - 4\,\beta\,\eta^2 + 2\,\beta^2\,\eta^2\Big) +$

$\Big(\Big(-\alpha\,\gamma\,\mu + T\,\alpha\,\gamma\,\mu - \alpha\,\beta\,\gamma\,\mu + T\,\alpha\,\beta\,\gamma\,\mu + 2\,T\,\alpha\,\gamma^2\,\mu - 2\,T^2\,\alpha\,\gamma^2\,\mu + \gamma\,\delta\,\mu - \beta^2\,\gamma\,\delta\,\mu - \gamma^2\,\delta\,\mu - $

$T\,\gamma^2\,\delta\,\mu - \beta\,\gamma^2\,\delta\,\mu + 3\,T\,\beta\,\gamma^2\,\delta\,\mu + 2\,T\,\gamma^3\,\delta\,\mu - 2\,T^2\,\gamma^3\,\delta\,\mu + 3\,\alpha\,\gamma\,\epsilon\,\mu + \alpha\,\beta\,\gamma\,\epsilon\,\mu - \alpha\,\gamma^2\,\epsilon\,\mu - $

$3\,T\,\alpha\,\gamma^2\,\epsilon\,\mu + 3\,\gamma^2\,\delta\,\epsilon\,\mu - \beta\,\gamma^2\,\delta\,\epsilon\,\mu - \gamma^3\,\delta\,\epsilon\,\mu - T\,\gamma^3\,\delta\,\epsilon\,\mu + \alpha\,\gamma^2\,\epsilon^2\,\mu + \alpha\,\eta\,\mu - \alpha\,\beta\,\eta\,\mu + $

$$2\,\alpha\,\gamma\,\eta\,\mu - 4\,\mathsf{T}\,\alpha\,\gamma\,\eta\,\mu + 2\,\alpha\,\beta\,\gamma\,\eta\,\mu - 2\,\mathsf{T}\,\alpha\,\gamma^2\,\eta\,\mu + 2\,\mathsf{T}^2\,\alpha\,\gamma^2\,\eta\,\mu - \beta\,\gamma\,\delta\,\eta\,\mu + \beta^2\,\gamma\,\delta\,\eta\,\mu + \gamma^2\,\delta\,\eta\,\mu -$$
$$3\,\mathsf{T}\,\gamma^2\,\delta\,\eta\,\mu + \beta\,\gamma^2\,\delta\,\eta\,\mu + \mathsf{T}\,\beta\,\gamma^2\,\delta\,\eta\,\mu - 4\,\alpha\,\gamma\,\epsilon\,\eta\,\mu - \alpha\,\beta\,\gamma\,\epsilon\,\eta\,\mu + \alpha\,\gamma^2\,\epsilon\,\eta\,\mu + \mathsf{T}\,\alpha\,\gamma^2\,\epsilon\,\eta\,\mu -$$
$$\gamma^2\,\delta\,\epsilon\,\eta\,\mu - 2\,\alpha\,\eta^2\,\mu + 2\,\alpha\,\beta\,\eta^2\,\mu - \alpha\,\gamma\,\eta^2\,\mu + 3\,\mathsf{T}\,\alpha\,\gamma\,\eta^2\,\mu - \alpha\,\beta\,\gamma\,\eta^2\,\mu - \mathsf{T}\,\alpha\,\beta\,\gamma\,\eta^2\,\mu - \gamma\,\delta\,\eta^2\,\mu +$$
$$\beta\,\gamma\,\delta\,\eta^2\,\mu + \alpha\,\gamma\,\epsilon\,\eta^2\,\mu + \alpha\,\eta^3\,\mu - \alpha\,\beta\,\eta^3\,\mu - \alpha\,\beta\,\nu + \mathsf{T}\,\alpha\,\beta\,\nu + \alpha\,\beta^2\,\nu - \mathsf{T}\,\alpha\,\beta^2\,\nu + 2\,\mathsf{T}\,\alpha\,\gamma\,\nu -$$
$$2\,\mathsf{T}^2\,\alpha\,\gamma\,\nu - 2\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\nu + 2\,\mathsf{T}^2\,\alpha\,\beta\,\gamma\,\nu + \beta\,\delta\,\nu - 2\,\beta^2\,\delta\,\nu + \beta^3\,\delta\,\nu - 2\,\mathsf{T}\,\gamma\,\delta\,\nu - \beta\,\gamma\,\delta\,\nu + 5\,\mathsf{T}\,\beta\,\gamma\,\delta\,\nu +$$
$$\beta^2\,\gamma\,\delta\,\nu - 3\,\mathsf{T}\,\beta^2\,\gamma\,\delta\,\nu + 2\,\mathsf{T}\,\gamma^2\,\delta\,\nu - 2\,\mathsf{T}^2\,\gamma^2\,\delta\,\nu - 2\,\mathsf{T}\,\beta\,\gamma^2\,\delta\,\nu + 2\,\mathsf{T}^2\,\beta\,\gamma^2\,\delta\,\nu + \alpha\,\epsilon\,\nu - \alpha\,\beta^2\,\epsilon\,\nu -$$
$$2\,\alpha\,\gamma\,\epsilon\,\nu - 2\,\mathsf{T}\,\alpha\,\gamma\,\epsilon\,\nu + \alpha\,\beta\,\gamma\,\epsilon\,\nu + 3\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\epsilon\,\nu + 3\,\gamma\,\delta\,\epsilon\,\nu - 4\,\beta\,\gamma\,\delta\,\epsilon\,\nu + \beta^2\,\gamma\,\delta\,\epsilon\,\nu -$$
$$2\,\gamma^2\,\delta\,\epsilon\,\nu + \beta\,\gamma^2\,\delta\,\epsilon\,\nu + \mathsf{T}\,\beta\,\gamma^2\,\delta\,\epsilon\,\nu + 3\,\alpha\,\gamma\,\epsilon^2\,\nu - \alpha\,\beta\,\gamma\,\epsilon^2\,\nu + \gamma^2\,\delta\,\epsilon^2\,\nu - 2\,\mathsf{T}\,\alpha\,\eta\,\nu + 2\,\alpha\,\beta\,\eta\,\nu +$$
$$2\,\mathsf{T}\,\alpha\,\beta\,\eta\,\nu - 2\,\alpha\,\beta^2\,\eta\,\nu - 2\,\mathsf{T}\,\alpha\,\gamma\,\eta\,\nu + 2\,\mathsf{T}^2\,\alpha\,\gamma\,\eta\,\nu + 2\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\eta\,\nu - 2\,\mathsf{T}^2\,\alpha\,\beta\,\gamma\,\eta\,\nu - \beta\,\delta\,\eta\,\nu +$$
$$2\,\beta^2\,\delta\,\eta\,\nu - \beta^3\,\delta\,\eta\,\nu - 2\,\mathsf{T}\,\gamma\,\delta\,\eta\,\nu + \beta\,\gamma\,\delta\,\eta\,\nu + 3\,\mathsf{T}\,\beta\,\gamma\,\delta\,\eta\,\nu - \beta^2\,\gamma\,\delta\,\eta\,\nu - \mathsf{T}\,\beta^2\,\gamma\,\delta\,\eta\,\nu - \alpha\,\beta\,\epsilon\,\eta\,\nu +$$
$$\alpha\,\beta^2\,\epsilon\,\eta\,\nu + 2\,\alpha\,\gamma\,\epsilon\,\eta\,\nu - \alpha\,\beta\,\gamma\,\epsilon\,\eta\,\nu - \mathsf{T}\,\alpha\,\beta\,\gamma\,\epsilon\,\eta\,\nu + \gamma\,\delta\,\epsilon\,\eta\,\nu - \beta\,\gamma\,\delta\,\epsilon\,\eta\,\nu - \alpha\,\gamma\,\epsilon^2\,\eta\,\nu +$$
$$2\,\mathsf{T}\,\alpha\,\eta^2\,\nu - \alpha\,\beta\,\eta^2\,\nu - 3\,\mathsf{T}\,\alpha\,\beta\,\eta^2\,\nu + \alpha\,\beta^2\,\eta^2\,\nu + \mathsf{T}\,\alpha\,\beta^2\,\eta^2\,\nu - \alpha\,\epsilon\,\eta^2\,\nu + \alpha\,\beta\,\epsilon\,\eta^2\,\nu\Big)\,\mathsf{p}_1\,\mathsf{x}_1\Big) \Big/$$
$$\Big(2 - 6\,\beta + 6\,\beta^2 - 2\,\beta^3 - 6\,\gamma\,\epsilon + 12\,\beta\,\gamma\,\epsilon - 6\,\beta^2\,\gamma\,\epsilon + 6\,\gamma^2\,\epsilon^2 - 6\,\beta\,\gamma^2\,\epsilon^2 - 2\,\gamma^3\,\epsilon^3 - 6\,\eta + 18\,\beta\,\eta -$$
$$18\,\beta^2\,\eta + 6\,\beta^3\,\eta + 12\,\gamma\,\epsilon\,\eta - 24\,\beta\,\gamma\,\epsilon\,\eta + 12\,\beta^2\,\gamma\,\epsilon\,\eta - 6\,\gamma^2\,\epsilon^2\,\eta + 6\,\beta\,\gamma^2\,\epsilon^2\,\eta + 6\,\eta^2 - 18\,\beta\,\eta^2 +$$
$$18\,\beta^2\,\eta^2 - 6\,\beta^3\,\eta^2 - 6\,\gamma\,\epsilon\,\eta^2 + 12\,\beta\,\gamma\,\epsilon\,\eta^2 - 6\,\beta^2\,\gamma\,\epsilon\,\eta^2 - 2\,\eta^3 + 6\,\beta\,\eta^3 - 6\,\beta^2\,\eta^3 + 2\,\beta^3\,\eta^3\Big) +$$
$$\Big(\Big(\alpha^2\,\gamma\,\mu^2 - \mathsf{T}\,\alpha^2\,\gamma\,\mu^2 - \mathsf{T}\,\alpha^2\,\gamma^2\,\mu^2 + \mathsf{T}^2\,\alpha^2\,\gamma^2\,\mu^2 - 2\,\alpha\,\gamma\,\delta\,\mu^2 + 2\,\alpha\,\beta\,\gamma\,\delta\,\mu^2 + 2\,\alpha\,\gamma^2\,\delta\,\mu^2 - 2\,\mathsf{T}\,\alpha\,\beta\,\gamma^2\,\delta\,\mu^2 -$$
$$2\,\mathsf{T}\,\alpha\,\gamma^3\,\delta\,\mu^2 + 2\,\mathsf{T}^2\,\alpha\,\gamma^3\,\delta\,\mu^2 - 2\,\gamma^2\,\delta^2\,\mu^2 + 2\,\beta\,\gamma^2\,\delta^2\,\mu^2 + \gamma^3\,\delta^2\,\mu^2 + \mathsf{T}\,\gamma^3\,\delta^2\,\mu^2 - 2\,\mathsf{T}\,\beta\,\gamma^3\,\delta^2\,\mu^2 -$$
$$\mathsf{T}\,\gamma^4\,\delta^2\,\mu^2 + \mathsf{T}^2\,\gamma^4\,\delta^2\,\mu^2 - 2\,\alpha^2\,\gamma\,\epsilon\,\mu^2 + 2\,\mathsf{T}\,\alpha^2\,\gamma^2\,\epsilon\,\mu^2 - 2\,\alpha\,\gamma^2\,\delta\,\epsilon\,\mu^2 + 2\,\mathsf{T}\,\alpha\,\gamma^3\,\delta\,\epsilon\,\mu^2 - 3\,\alpha^2\,\gamma\,\eta\,\mu^2 +$$
$$3\,\mathsf{T}\,\alpha^2\,\gamma\,\eta\,\mu^2 + 2\,\mathsf{T}\,\alpha^2\,\gamma^2\,\eta\,\mu^2 - 2\,\mathsf{T}^2\,\alpha^2\,\gamma^2\,\eta\,\mu^2 + 4\,\alpha\,\gamma\,\delta\,\eta\,\mu^2 - 4\,\alpha\,\beta\,\gamma\,\delta\,\eta\,\mu^2 - 4\,\alpha\,\gamma^2\,\delta\,\eta\,\mu^2 +$$
$$2\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\eta\,\mu^2 + 2\,\mathsf{T}\,\alpha\,\beta\,\gamma^2\,\delta\,\eta\,\mu^2 + 2\,\mathsf{T}\,\alpha\,\gamma^3\,\delta\,\eta\,\mu^2 - 2\,\mathsf{T}^2\,\alpha\,\gamma^3\,\delta\,\eta\,\mu^2 + 2\,\gamma^2\,\delta^2\,\eta\,\mu^2 - 2\,\beta\,\gamma^2\,\delta^2\,\eta\,\mu^2 -$$
$$\gamma^3\,\delta^2\,\eta\,\mu^2 + \mathsf{T}\,\gamma^3\,\delta^2\,\eta\,\mu^2 + 4\,\alpha^2\,\gamma\,\epsilon\,\eta\,\mu^2 - 2\,\mathsf{T}\,\alpha^2\,\gamma^2\,\epsilon\,\eta\,\mu^2 + 2\,\alpha\,\gamma^2\,\delta\,\epsilon\,\eta\,\mu^2 + 3\,\alpha^2\,\gamma\,\eta^2\,\mu^2 -$$
$$3\,\mathsf{T}\,\alpha^2\,\gamma\,\eta^2\,\mu^2 - \mathsf{T}\,\alpha^2\,\gamma^2\,\eta^2\,\mu^2 + \mathsf{T}^2\,\alpha^2\,\gamma^2\,\eta^2\,\mu^2 - 2\,\alpha\,\gamma\,\delta\,\eta^2\,\mu^2 + 2\,\alpha\,\beta\,\gamma\,\delta\,\eta^2\,\mu^2 + 2\,\alpha\,\gamma^2\,\delta\,\eta^2\,\mu^2 -$$
$$2\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\eta^2\,\mu^2 - 2\,\alpha^2\,\gamma\,\epsilon\,\eta^2\,\mu^2 - \alpha^2\,\gamma\,\eta^3\,\mu^2 + \mathsf{T}\,\alpha^2\,\gamma\,\eta^3\,\mu^2 + \alpha^2\,\mu\,\nu - \mathsf{T}\,\alpha^2\,\mu\,\nu - \alpha^2\,\beta\,\mu\,\nu +$$
$$\mathsf{T}\,\alpha^2\,\beta\,\mu\,\nu - 2\,\mathsf{T}\,\alpha^2\,\gamma\,\mu\,\nu + 2\,\mathsf{T}^2\,\alpha^2\,\gamma\,\mu\,\nu + 2\,\mathsf{T}\,\alpha^2\,\beta\,\gamma\,\mu\,\nu - 2\,\mathsf{T}^2\,\alpha^2\,\beta\,\gamma\,\mu\,\nu - 2\,\alpha\,\delta\,\mu\,\nu + 4\,\alpha\,\beta\,\delta\,\mu\,\nu -$$
$$2\,\alpha\,\beta^2\,\delta\,\mu\,\nu + 2\,\alpha\,\gamma\,\delta\,\mu\,\nu + 2\,\mathsf{T}\,\alpha\,\gamma\,\delta\,\mu\,\nu - 2\,\alpha\,\beta\,\gamma\,\delta\,\mu\,\nu - 6\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\delta\,\mu\,\nu + 4\,\mathsf{T}\,\alpha\,\beta^2\,\gamma\,\delta\,\mu\,\nu -$$
$$4\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\mu\,\nu + 4\,\mathsf{T}^2\,\alpha\,\gamma^2\,\delta\,\mu\,\nu + 4\,\mathsf{T}\,\alpha\,\beta\,\gamma^2\,\delta\,\mu\,\nu - 4\,\mathsf{T}^2\,\alpha\,\beta\,\gamma^2\,\delta\,\mu\,\nu - 2\,\gamma\,\delta^2\,\mu\,\nu + 4\,\beta\,\gamma\,\delta^2\,\mu\,\nu -$$
$$2\,\beta^2\,\gamma\,\delta^2\,\mu\,\nu + \gamma^2\,\delta^2\,\mu\,\nu + 3\,\mathsf{T}\,\gamma^2\,\delta^2\,\mu\,\nu - \beta\,\gamma^2\,\delta^2\,\mu\,\nu - 7\,\mathsf{T}\,\beta\,\gamma^2\,\delta^2\,\mu\,\nu + 4\,\mathsf{T}\,\beta^2\,\gamma^2\,\delta^2\,\mu\,\nu -$$
$$2\,\mathsf{T}\,\gamma^3\,\delta^2\,\mu\,\nu + 2\,\mathsf{T}^2\,\gamma^3\,\delta^2\,\mu\,\nu + 2\,\mathsf{T}\,\beta\,\gamma^3\,\delta^2\,\mu\,\nu - 2\,\mathsf{T}^2\,\beta\,\gamma^3\,\delta^2\,\mu\,\nu - 2\,\alpha^2\,\epsilon\,\mu\,\nu + 2\,\alpha^2\,\beta\,\epsilon\,\mu\,\nu +$$
$$\alpha^2\,\gamma\,\epsilon\,\mu\,\nu + 3\,\mathsf{T}\,\alpha^2\,\gamma\,\epsilon\,\mu\,\nu - 4\,\mathsf{T}\,\alpha^2\,\beta\,\gamma\,\epsilon\,\mu\,\nu - 4\,\alpha\,\gamma\,\delta\,\epsilon\,\mu\,\nu + 4\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\mu\,\nu + 2\,\alpha\,\gamma^2\,\delta\,\epsilon\,\mu\,\nu +$$
$$2\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\epsilon\,\mu\,\nu - 4\,\mathsf{T}\,\alpha\,\beta\,\gamma^2\,\delta\,\epsilon\,\mu\,\nu - 2\,\gamma^2\,\delta^2\,\epsilon\,\mu\,\nu + 2\,\beta\,\gamma^2\,\delta^2\,\epsilon\,\mu\,\nu + \gamma^3\,\delta^2\,\epsilon\,\mu\,\nu - \mathsf{T}\,\gamma^3\,\delta^2\,\epsilon\,\mu\,\nu -$$
$$2\,\alpha^2\,\gamma\,\epsilon^2\,\mu\,\nu - 2\,\alpha\,\gamma^2\,\delta\,\epsilon^2\,\mu\,\nu - 3\,\alpha^2\,\eta\,\mu\,\nu + 3\,\mathsf{T}\,\alpha^2\,\eta\,\mu\,\nu + 3\,\alpha^2\,\beta\,\eta\,\mu\,\nu - 3\,\mathsf{T}\,\alpha^2\,\beta\,\eta\,\mu\,\nu +$$
$$4\,\mathsf{T}\,\alpha^2\,\gamma\,\eta\,\mu\,\nu - 4\,\mathsf{T}^2\,\alpha^2\,\gamma\,\eta\,\mu\,\nu - 4\,\mathsf{T}\,\alpha^2\,\beta\,\gamma\,\eta\,\mu\,\nu + 4\,\mathsf{T}^2\,\alpha^2\,\beta\,\gamma\,\eta\,\mu\,\nu + 4\,\alpha\,\delta\,\eta\,\mu\,\nu - 8\,\alpha\,\beta\,\delta\,\eta\,\mu\,\nu +$$
$$4\,\alpha\,\beta^2\,\delta\,\eta\,\mu\,\nu - 4\,\alpha\,\gamma\,\delta\,\eta\,\mu\,\nu + 4\,\alpha\,\beta\,\gamma\,\delta\,\eta\,\mu\,\nu + 4\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\delta\,\eta\,\mu\,\nu - 4\,\mathsf{T}\,\alpha\,\beta^2\,\gamma\,\delta\,\eta\,\mu\,\nu +$$
$$4\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\eta\,\mu\,\nu - 4\,\mathsf{T}^2\,\alpha\,\gamma^2\,\delta\,\eta\,\mu\,\nu - 4\,\mathsf{T}\,\alpha\,\beta\,\gamma^2\,\delta\,\eta\,\mu\,\nu + 4\,\mathsf{T}^2\,\alpha\,\beta\,\gamma^2\,\delta\,\eta\,\mu\,\nu + 2\,\gamma\,\delta^2\,\eta\,\mu\,\nu -$$
$$4\,\beta\,\gamma\,\delta^2\,\eta\,\mu\,\nu + 2\,\beta^2\,\gamma\,\delta^2\,\eta\,\mu\,\nu - \gamma^2\,\delta^2\,\eta\,\mu\,\nu + \mathsf{T}\,\gamma^2\,\delta^2\,\eta\,\mu\,\nu + \beta\,\gamma^2\,\delta^2\,\eta\,\mu\,\nu - \mathsf{T}\,\beta\,\gamma^2\,\delta^2\,\eta\,\mu\,\nu +$$
$$4\,\alpha^2\,\epsilon\,\eta\,\mu\,\nu - 4\,\alpha^2\,\beta\,\epsilon\,\eta\,\mu\,\nu - 2\,\alpha^2\,\gamma\,\epsilon\,\eta\,\mu\,\nu - 2\,\mathsf{T}\,\alpha^2\,\gamma\,\epsilon\,\eta\,\mu\,\nu + 4\,\mathsf{T}\,\alpha^2\,\beta\,\gamma\,\epsilon\,\eta\,\mu\,\nu + 4\,\alpha\,\gamma\,\delta\,\epsilon\,\eta\,\mu\,\nu -$$
$$4\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\eta\,\mu\,\nu - 2\,\alpha\,\gamma^2\,\delta\,\epsilon\,\eta\,\mu\,\nu + 2\,\mathsf{T}\,\alpha\,\gamma^2\,\delta\,\epsilon\,\eta\,\mu\,\nu + 2\,\alpha^2\,\gamma\,\epsilon^2\,\eta\,\mu\,\nu + 3\,\alpha^2\,\eta^2\,\mu\,\nu -$$
$$3\,\mathsf{T}\,\alpha^2\,\eta^2\,\mu\,\nu - 3\,\alpha^2\,\beta\,\eta^2\,\mu\,\nu + 3\,\mathsf{T}\,\alpha^2\,\beta\,\eta^2\,\mu\,\nu - 2\,\mathsf{T}\,\alpha^2\,\gamma\,\eta^2\,\mu\,\nu + 2\,\mathsf{T}^2\,\alpha^2\,\gamma\,\eta^2\,\mu\,\nu + 2\,\mathsf{T}\,\alpha^2\,\beta\,\gamma\,\eta^2\,\mu\,\nu -$$
$$2\,\mathsf{T}^2\,\alpha^2\,\beta\,\gamma\,\eta^2\,\mu\,\nu - 2\,\alpha\,\delta\,\eta^2\,\mu\,\nu + 4\,\alpha\,\beta\,\delta\,\eta^2\,\mu\,\nu - 2\,\alpha\,\beta^2\,\delta\,\eta^2\,\mu\,\nu + 2\,\alpha\,\gamma\,\delta\,\eta^2\,\mu\,\nu - 2\,\mathsf{T}\,\alpha\,\gamma\,\delta\,\eta^2\,\mu\,\nu -$$
$$2\,\alpha\,\beta\,\gamma\,\delta\,\eta^2\,\mu\,\nu + 2\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\delta\,\eta^2\,\mu\,\nu - 2\,\alpha^2\,\epsilon\,\eta^2\,\mu\,\nu + 2\,\alpha^2\,\beta\,\epsilon\,\eta^2\,\mu\,\nu + \alpha^2\,\gamma\,\epsilon\,\eta^2\,\mu\,\nu -$$
$$\mathsf{T}\,\alpha^2\,\gamma\,\epsilon\,\eta^2\,\mu\,\nu - \alpha^2\,\eta^3\,\mu\,\nu + \mathsf{T}\,\alpha^2\,\eta^3\,\mu\,\nu + \alpha^2\,\beta\,\eta^3\,\mu\,\nu - \mathsf{T}\,\alpha^2\,\beta\,\eta^3\,\mu\,\nu - \mathsf{T}\,\alpha^2\,\nu^2 + \mathsf{T}^2\,\alpha^2\,\nu^2 +$$
$$2\,\mathsf{T}\,\alpha^2\,\beta\,\nu^2 - 2\,\mathsf{T}^2\,\alpha^2\,\beta\,\nu^2 - \mathsf{T}\,\alpha^2\,\beta^2\,\nu^2 + \mathsf{T}^2\,\alpha^2\,\beta^2\,\nu^2 + 2\,\mathsf{T}\,\alpha\,\delta\,\nu^2 - 6\,\mathsf{T}\,\alpha\,\beta\,\delta\,\nu^2 + 6\,\mathsf{T}\,\alpha\,\beta^2\,\delta\,\nu^2 -$$
$$2\,\mathsf{T}\,\alpha\,\beta^3\,\delta\,\nu^2 - 2\,\mathsf{T}\,\alpha\,\gamma\,\delta\,\nu^2 + 2\,\mathsf{T}^2\,\alpha\,\gamma\,\delta\,\nu^2 + 4\,\mathsf{T}\,\alpha\,\beta\,\gamma\,\delta\,\nu^2 - 4\,\mathsf{T}^2\,\alpha\,\beta\,\gamma\,\delta\,\nu^2 - 2\,\mathsf{T}\,\alpha\,\beta^2\,\gamma\,\delta\,\nu^2 +$$
$$2\,\mathsf{T}^2\,\alpha\,\beta^2\,\gamma\,\delta\,\nu^2 + 2\,\mathsf{T}\,\gamma\,\delta^2\,\nu^2 - 6\,\mathsf{T}\,\beta\,\gamma\,\delta^2\,\nu^2 + 6\,\mathsf{T}\,\beta^2\,\gamma\,\delta^2\,\nu^2 - 2\,\mathsf{T}\,\beta^3\,\gamma\,\delta^2\,\nu^2 - \mathsf{T}\,\gamma^2\,\delta^2\,\nu^2 +$$

$$T^2\,\gamma^2\,\delta^2\,\nu^2 + 2\,T\,\beta\,\gamma^2\,\delta^2\,\nu^2 - 2\,T^2\,\beta\,\gamma^2\,\delta^2\,\nu^2 - T\,\beta^2\,\gamma^2\,\delta^2\,\nu^2 + T^2\,\beta^2\,\gamma^2\,\delta^2\,\nu^2 + \alpha^2\,\epsilon\,\nu^2 + T\,\alpha^2\,\epsilon\,\nu^2 -$$
$$\alpha^2\,\beta\,\epsilon\,\nu^2 - 3\,T\,\alpha^2\,\beta\,\epsilon\,\nu^2 + 2\,T\,\alpha^2\,\beta^2\,\epsilon\,\nu^2 - 2\,\alpha\,\delta\,\epsilon\,\nu^2 + 4\,\alpha\,\beta\,\delta\,\epsilon\,\nu^2 - 2\,\alpha\,\beta^2\,\delta\,\epsilon\,\nu^2 + 2\,\alpha\,\gamma\,\delta\,\epsilon\,\nu^2 -$$
$$2\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\nu^2 - 2\,T\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\nu^2 + 2\,T\,\alpha\,\beta^2\,\gamma\,\delta\,\epsilon\,\nu^2 - 2\,\gamma\,\delta^2\,\epsilon\,\nu^2 + 4\,\beta\,\gamma\,\delta^2\,\epsilon\,\nu^2 - 2\,\beta^2\,\gamma\,\delta^2\,\epsilon\,\nu^2 +$$
$$\gamma^2\,\delta^2\,\epsilon\,\nu^2 - T\,\gamma^2\,\delta^2\,\epsilon\,\nu^2 - \beta\,\gamma^2\,\delta^2\,\epsilon\,\nu^2 + T\,\beta\,\gamma^2\,\delta^2\,\epsilon\,\nu^2 - 2\,\alpha^2\,\epsilon^2\,\nu^2 + 2\,\alpha^2\,\beta\,\epsilon^2\,\nu^2 - 2\,\alpha\,\gamma\,\delta\,\epsilon^2\,\nu^2 +$$
$$2\,\alpha\,\beta\,\gamma\,\delta\,\epsilon^2\,\nu^2 + 2\,T\,\alpha^2\,\eta\,\nu^2 - 2\,T^2\,\alpha^2\,\eta\,\nu^2 - 4\,T\,\alpha^2\,\beta\,\eta\,\nu^2 + 4\,T^2\,\alpha^2\,\beta\,\eta\,\nu^2 + 2\,T\,\alpha^2\,\beta^2\,\eta\,\nu^2 -$$
$$2\,T^2\,\alpha^2\,\beta^2\,\eta\,\nu^2 - 2\,T\,\alpha\,\delta\,\eta\,\nu^2 + 6\,T\,\alpha\,\beta\,\delta\,\eta\,\nu^2 - 6\,T\,\alpha\,\beta^2\,\delta\,\eta\,\nu^2 + 2\,T\,\alpha\,\beta^3\,\delta\,\eta\,\nu^2 + 2\,T\,\alpha\,\gamma\,\delta\,\eta\,\nu^2 -$$
$$2\,T^2\,\alpha\,\gamma\,\delta\,\eta\,\nu^2 - 4\,T\,\alpha\,\beta\,\gamma\,\delta\,\eta\,\nu^2 + 4\,T^2\,\alpha\,\beta\,\gamma\,\delta\,\eta\,\nu^2 + 2\,T\,\alpha\,\beta^2\,\gamma\,\delta\,\eta\,\nu^2 - 2\,T^2\,\alpha\,\beta^2\,\gamma\,\delta\,\eta\,\nu^2 -$$
$$2\,\alpha^2\,\epsilon\,\eta\,\nu^2 + 2\,\alpha^2\,\beta\,\epsilon\,\eta\,\nu^2 + 2\,T\,\alpha^2\,\beta\,\epsilon\,\eta\,\nu^2 - 2\,T\,\alpha^2\,\beta^2\,\epsilon\,\eta\,\nu^2 + 2\,\alpha\,\delta\,\epsilon\,\eta\,\nu^2 - 4\,\alpha\,\beta\,\delta\,\epsilon\,\eta\,\nu^2 +$$
$$2\,\alpha\,\beta^2\,\delta\,\epsilon\,\eta\,\nu^2 - 2\,\alpha\,\gamma\,\delta\,\epsilon\,\eta\,\nu^2 + 2\,T\,\alpha\,\gamma\,\delta\,\epsilon\,\eta\,\nu^2 + 2\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\eta\,\nu^2 - 2\,T\,\alpha\,\beta\,\gamma\,\delta\,\epsilon\,\eta\,\nu^2 +$$
$$2\,\alpha^2\,\epsilon^2\,\eta\,\nu^2 - 2\,\alpha^2\,\beta\,\epsilon^2\,\eta\,\nu^2 - T\,\alpha^2\,\eta^2\,\nu^2 + T^2\,\alpha^2\,\eta^2\,\nu^2 + 2\,T\,\alpha^2\,\beta\,\eta^2\,\nu^2 - 2\,T^2\,\alpha^2\,\beta\,\eta^2\,\nu^2 -$$
$$T\,\alpha^2\,\beta^2\,\eta^2\,\nu^2 + T^2\,\alpha^2\,\beta^2\,\eta^2\,\nu^2 + \alpha^2\,\epsilon\,\eta^2\,\nu^2 - T\,\alpha^2\,\epsilon\,\eta^2\,\nu^2 - \alpha^2\,\beta\,\epsilon\,\eta^2\,\nu^2 + T\,\alpha^2\,\beta\,\epsilon\,\eta^2\,\nu^2\Big)\;p_1^2\,x_1^2\Big)\;/$$

$$\Big(4 - 16\,\beta + 24\,\beta^2 - 16\,\beta^3 + 4\,\beta^4 - 16\,\gamma\,\epsilon + 48\,\beta\,\gamma\,\epsilon - 48\,\beta^2\,\gamma\,\epsilon + 16\,\beta^3\,\gamma\,\epsilon + 24\,\gamma^2\,\epsilon^2 -$$
$$48\,\beta\,\gamma^2\,\epsilon^2 + 24\,\beta^2\,\gamma^2\,\epsilon^2 - 16\,\gamma^3\,\epsilon^3 + 16\,\beta\,\gamma^3\,\epsilon^3 + 4\,\gamma^4\,\epsilon^4 - 16\,\eta + 64\,\beta\,\eta -$$
$$96\,\beta^2\,\eta + 64\,\beta^3\,\eta - 16\,\beta^4\,\eta + 48\,\gamma\,\epsilon\,\eta - 144\,\beta\,\gamma\,\epsilon\,\eta + 144\,\beta^2\,\gamma\,\epsilon\,\eta - 48\,\beta^3\,\gamma\,\epsilon\,\eta -$$
$$48\,\gamma^2\,\epsilon^2\,\eta + 96\,\beta\,\gamma^2\,\epsilon^2\,\eta - 48\,\beta^2\,\gamma^2\,\epsilon^2\,\eta + 16\,\gamma^3\,\epsilon^3\,\eta - 16\,\beta\,\gamma^3\,\epsilon^3\,\eta +$$
$$24\,\eta^2 - 96\,\beta\,\eta^2 + 144\,\beta^2\,\eta^2 - 96\,\beta^3\,\eta^2 + 24\,\beta^4\,\eta^2 - 48\,\gamma\,\epsilon\,\eta^2 + 144\,\beta\,\gamma\,\epsilon\,\eta^2 -$$
$$144\,\beta^2\,\gamma\,\epsilon\,\eta^2 + 48\,\beta^3\,\gamma\,\epsilon\,\eta^2 + 24\,\gamma^2\,\epsilon^2\,\eta^2 - 48\,\beta\,\gamma^2\,\epsilon^2\,\eta^2 + 24\,\beta^2\,\gamma^2\,\epsilon^2\,\eta^2 -$$
$$16\,\eta^3 + 64\,\beta\,\eta^3 - 96\,\beta^2\,\eta^3 + 64\,\beta^3\,\eta^3 - 16\,\beta^4\,\eta^3 + 16\,\gamma\,\epsilon\,\eta^3 - 48\,\beta\,\gamma\,\epsilon\,\eta^3 +$$
$$48\,\beta^2\,\gamma\,\epsilon\,\eta^3 - 16\,\beta^3\,\gamma\,\epsilon\,\eta^3 + 4\,\eta^4 - 16\,\beta\,\eta^4 + 24\,\beta^2\,\eta^4 - 16\,\beta^3\,\eta^4 + 4\,\beta^4\,\eta^4\Big)\Big]\Big]$$

In[ ]:= **Simplify$\Big[\;(\beta\,\gamma - T\,\beta\,\gamma - T\,\gamma^2 + T^2\,\gamma^2 - \gamma\,\epsilon - \beta\,\gamma\,\epsilon + \gamma^2\,\epsilon + T\,\gamma^2\,\epsilon -$**
$$\gamma^2\,\epsilon^2 - \beta\,\eta + \beta^2\,\eta + 2\,T\,\gamma\,\eta - \beta\,\gamma\,\eta - T\,\beta\,\gamma\,\eta - \gamma\,\epsilon\,\eta + 2\,\beta\,\gamma\,\epsilon\,\eta + \beta\,\eta^2 - \beta^2\,\eta^2)\;/$$
$$\Big(2 - 4\,\beta + 2\,\beta^2 - 4\,\gamma\,\epsilon + 4\,\beta\,\gamma\,\epsilon + 2\,\gamma^2\,\epsilon^2 - 4\,\eta + 8\,\beta\,\eta - 4\,\beta^2\,\eta + 4\,\gamma\,\epsilon\,\eta - 4\,\beta\,\gamma\,\epsilon\,\eta + 2\,\eta^2 - 4\,\beta\,\eta^2 + 2\,\beta^2\,\eta^2)\Big]$$

Out[ ]= $\Big(\beta\;(-1+\eta)\;\eta - \beta^2\;(-1+\eta)\;\eta - \beta\,\gamma\;(-1+T+\epsilon+\eta+T\,\eta-2\,\epsilon\,\eta) +$
$$\gamma\;\Big(T^2\,\gamma - \epsilon\;(1+\gamma\;(-1+\epsilon)+\eta)+T\;(\gamma\;(-1+\epsilon)+2\,\eta)\Big)\Big)\;/\;\Big(2\;(-1+\beta+\gamma\,\epsilon+\eta-\beta\,\eta)^2\Big)$$

In[ ]:= $\Big($**IdentityMatrix[3]** $-\begin{pmatrix}\alpha & \beta & \gamma \\ \delta & \epsilon & \eta \\ \lambda & \mu & \nu\end{pmatrix}\Big)$ **// Det // Simplify**

Out[ ]= $1 - \epsilon - \gamma\,\lambda + \gamma\,\epsilon\,\lambda - \gamma\,\delta\,\mu - \eta\,\mu - \nu + \epsilon\,\nu - \beta\;(\delta + \eta\,\lambda - \delta\,\nu) + \alpha\;(-1 + \epsilon + \eta\,\mu + \nu - \epsilon\,\nu)$

Solving for R, C, $k = 2$

In[ ]:= **$k = 2;**
{R$_{1,2}$, C$_1$}
Short[RMoves, 20]

$\text{Out[\textbullet]=}\ \Big\{ \mathbb{E}_{\{\}\to\{1,2\}}\Big[\sqrt{T}\,,\ (-1+T)\ p_1\ x_2 + (1-T)\ p_2\ x_2,$

$\epsilon\text{Series}\Big[0,\ \frac{1}{4}\ (-1+T)\ p_1^2\ x_1\ x_2 - \frac{1}{2}\ T\ p_1\ p_2\ x_1\ x_2 + \frac{1}{4}\ \left(T - T^2\right)\ p_1^2\ x_2^2 + \frac{1}{2}\ T^2\ p_1\ p_2\ x_2^2,$

$c_{2,1} + T\ p_2\ x_1\ c_{2,4} + p_1\ x_1\ (c_{2,2} + c_{2,4} - T\ c_{2,4}) + T\ p_2\ x_2\ c_{2,5} + p_1\ x_2\ (c_{2,3} + c_{2,5} - T\ c_{2,5}) + T^2\ p_2^2\ x_1^2\ c_{2,12} +$

$p_1\ p_2\ x_1^2\ \left(T\ c_{2,9} + 2\ T\ c_{2,12} - 2\ T^2\ c_{2,12}\right) + p_1^2\ x_1^2\ \left(c_{2,6} + c_{2,9} - T\ c_{2,9} + c_{2,12} - 2\ T\ c_{2,12} + T^2\ c_{2,12}\right) +$

$T^2\ p_2^2\ x_1\ x_2\ c_{2,13} + p_1\ p_2\ x_1\ x_2\ \left(T\ c_{2,10} + 2\ T\ c_{2,13} - 2\ T^2\ c_{2,13}\right) +$

$p_1^2\ x_1\ x_2\ \left(c_{2,7} + c_{2,10} - T\ c_{2,10} + c_{2,13} - 2\ T\ c_{2,13} + T^2\ c_{2,13}\right) + T^2\ p_2^2\ x_2^2\ c_{2,14} +$

$p_1\ p_2\ x_2^2\ \left(T\ c_{2,11} + 2\ T\ c_{2,14} - 2\ T^2\ c_{2,14}\right) + p_1^2\ x_2^2\ \left(c_{2,8} + c_{2,11} - T\ c_{2,11} + c_{2,14} - 2\ T\ c_{2,14} + T^2\ c_{2,14}\right) +$

$T^3\ p_2^3\ x_1^3\ c_{2,27} + p_1\ p_2^2\ x_1^3\ \left(T^2\ c_{2,23} + 3\ T^2\ c_{2,27} - 3\ T^3\ c_{2,27}\right) +$

$p_1^3\ x_1^3\ \left(c_{2,15} + c_{2,19} - T\ c_{2,19} + c_{2,23} - 2\ T\ c_{2,23} + T^2\ c_{2,23} + c_{2,27} - 3\ T\ c_{2,27} + 3\ T^2\ c_{2,27} - T^3\ c_{2,27}\right) +$

$p_1^2\ p_2\ x_1^3\ \left(T\ c_{2,19} + 2\ T\ c_{2,23} - 2\ T^2\ c_{2,23} + 3\ T\ c_{2,27} - 6\ T^2\ c_{2,27} + 3\ T^3\ c_{2,27}\right) +$

$T^3\ p_2^3\ x_1^2\ x_2\ c_{2,28} + p_1\ p_2^2\ x_1^2\ x_2\ \left(T^2\ c_{2,24} + 3\ T^2\ c_{2,28} - 3\ T^3\ c_{2,28}\right) +$

$p_1^3\ x_1^2\ x_2\ \left(c_{2,16} + c_{2,20} - T\ c_{2,20} + c_{2,24} - 2\ T\ c_{2,24} + T^2\ c_{2,24} + c_{2,28} - 3\ T\ c_{2,28} + 3\ T^2\ c_{2,28} - T^3\ c_{2,28}\right) +$

$p_1^2\ p_2\ x_1^2\ x_2\ \left(T\ c_{2,20} + 2\ T\ c_{2,24} - 2\ T^2\ c_{2,24} + 3\ T\ c_{2,28} - 6\ T^2\ c_{2,28} + 3\ T^3\ c_{2,28}\right) +$

$T^3\ p_2^3\ x_1\ x_2^2\ c_{2,29} + p_1\ p_2^2\ x_1\ x_2^2\ \left(T^2\ c_{2,25} + 3\ T^2\ c_{2,29} - 3\ T^3\ c_{2,29}\right) +$

$p_1^3\ x_1\ x_2^2\ \left(c_{2,17} + c_{2,21} - T\ c_{2,21} + c_{2,25} - 2\ T\ c_{2,25} + T^2\ c_{2,25} + c_{2,29} - 3\ T\ c_{2,29} + 3\ T^2\ c_{2,29} - T^3\ c_{2,29}\right) +$

$p_1^2\ p_2\ x_1\ x_2^2\ \left(T\ c_{2,21} + 2\ T\ c_{2,25} - 2\ T^2\ c_{2,25} + 3\ T\ c_{2,29} - 6\ T^2\ c_{2,29} + 3\ T^3\ c_{2,29}\right) +$

$T^3\ p_2^3\ x_2^3\ c_{2,30} + p_1\ p_2^2\ x_2^3\ \left(T^2\ c_{2,26} + 3\ T^2\ c_{2,30} - 3\ T^3\ c_{2,30}\right) +$

$p_1^3\ x_2^3\ \left(c_{2,18} + c_{2,22} - T\ c_{2,22} + c_{2,26} - 2\ T\ c_{2,26} + T^2\ c_{2,26} + c_{2,30} - 3\ T\ c_{2,30} + 3\ T^2\ c_{2,30} - T^3\ c_{2,30}\right) +$

$p_1^2\ p_2\ x_2^3\ \left(T\ c_{2,22} + 2\ T\ c_{2,26} - 2\ T^2\ c_{2,26} + 3\ T\ c_{2,30} - 6\ T^2\ c_{2,30} + 3\ T^3\ c_{2,30}\right) \Big]\Big],$

$\mathbb{E}_{\{\}\to\{1\}}\Big[\sqrt{T}\,,\ 0,\ \epsilon\text{Series}\Big[0,\ \frac{p_1\ x_1}{2}\,,\ e_{2,1} + p_1\ x_1\ e_{2,2} + p_1^2\ x_1^2\ e_{2,3} + p_1^3\ x_1^3\ e_{2,4}\Big]\Big]\Big\}$

Out[◦]//Short=

$$\Big\{ \frac{1}{2} \left(-T^2 + T^3 \right) p_1^2 p_3 x_1 x_2 x_3 - \frac{3}{4} T^3 p_1 p_2 p_3 x_1 x_2 x_3 +$$

$$\frac{1}{4} \left(-T^3 + 3 T^4 \right) p_1 p_2 p_3 x_1 x_3^2 + 3 c_{2,1} + T p_2 x_1 c_{2,4} + T p_3 x_1 c_{2,4} + T^2 p_3 x_2 c_{2,4} + \ll 104 \gg +$$

$$p_1 p_3^2 x_3^3 \left(T^4 c_{2,26} + 3 T^4 c_{2,30} - 3 T^6 c_{2,30} \right) + p_2 p_3^2 x_3^3 \left(T^5 c_{2,26} + 3 T^5 c_{2,30} - 3 T^6 c_{2,30} \right) +$$

$$p_2^3 x_3^3 \left(T^3 c_{2,18} + T^3 c_{2,22} - T^4 c_{2,22} + T^3 c_{2,26} - 2 T^4 c_{2,26} + T^5 c_{2,26} + T^6 c_{2,27} - \right.$$

$$3 T^7 c_{2,27} + 3 T^8 c_{2,27} - T^9 c_{2,27} + T^5 c_{2,28} - 3 T^6 c_{2,28} + 3 T^7 c_{2,28} - T^8 c_{2,28} + T^4 c_{2,29} -$$

$$\left. 3 T^5 c_{2,29} + 3 T^6 c_{2,29} - T^7 c_{2,29} + 2 T^3 c_{2,30} - 6 T^4 c_{2,30} + 6 T^5 c_{2,30} - 2 T^6 c_{2,30} \right) +$$

$$p_1 p_2^2 x_3^3 \left(3 T^2 c_{2,18} - 3 T^3 c_{2,18} + 3 T^2 c_{2,22} - 5 T^3 c_{2,22} + 2 T^4 c_{2,22} + T^5 c_{2,23} - 3 T^6 c_{2,23} + 3 T^7 c_{2,23} - \right.$$

$$T^8 c_{2,23} + T^4 c_{2,24} - 3 T^5 c_{2,24} + 3 T^6 c_{2,24} - T^7 c_{2,24} + T^3 c_{2,25} - 3 T^4 c_{2,25} + 3 T^5 c_{2,25} - T^6 c_{2,25} +$$

$$4 T^2 c_{2,26} - 10 T^3 c_{2,26} + 8 T^4 c_{2,26} - 2 T^5 c_{2,26} + 3 T^5 c_{2,27} - 12 T^6 c_{2,27} + 18 T^7 c_{2,27} - 12 T^8 c_{2,27} +$$

$$3 T^9 c_{2,27} + 3 T^4 c_{2,28} - 12 T^5 c_{2,28} + 18 T^6 c_{2,28} - 12 T^7 c_{2,28} + 3 T^8 c_{2,28} + 3 T^3 c_{2,29} - 12 T^4 c_{2,29} +$$

$$\left. 18 T^5 c_{2,29} - 12 T^6 c_{2,29} + 3 T^7 c_{2,29} + 6 T^2 c_{2,30} - 21 T^3 c_{2,30} + 27 T^4 c_{2,30} - 15 T^5 c_{2,30} + 3 T^6 c_{2,30} \right) +$$

$$p_2^2 p_3 x_3^3 \left(T^4 c_{2,22} + 2 T^4 c_{2,26} - 2 T^5 c_{2,26} + 3 T^4 c_{2,30} - 6 T^5 c_{2,30} + 3 T^6 c_{2,30} \right) +$$

$$\frac{1}{2} p_1^2 p_3 x_3^3 \left(-T^5 + T^6 + 2 T^2 c_{2,22} - 4 T^3 c_{2,22} + 4 T^4 c_{2,22} + 4 T^2 c_{2,26} - 8 T^3 c_{2,26} + 8 T^4 c_{2,26} - 4 T^5 c_{2,26} + \right.$$

$$\left. 6 T^2 c_{2,30} - 12 T^3 c_{2,30} + 12 T^4 c_{2,30} - 12 T^5 c_{2,30} + 6 T^6 c_{2,30} \right) == 3 c_{2,1} + T^2 p_3 x_1 c_{2,4} +$$

$$\ll 143 \gg + p_2^2 p_3 x_3^3 \left(T^4 c_{2,22} + 2 T^4 c_{2,26} - 2 T^5 c_{2,26} + 6 T^4 c_{2,30} - 12 T^5 c_{2,30} + 6 T^6 c_{2,30} \right),$$

$$\ll 7 \gg, \ \frac{p_1^3 x_1^3 \left(T^3 c_{2,15} + T^2 c_{2,16} + \ll 13 \gg + c_{2,30} + e_{2,4} \right)}{T^3} +$$

$$\frac{p_1^2 \ll 1 \gg \left(\ll 50 \gg + \ll 1 \gg \right)}{8 T^3} + \frac{\ll 1 \gg}{4 \ll 1 \gg} + \frac{\ll 47 \gg + 24 T^3 e_{2,4}}{4 T^3} == 0 \Big\}$$

In[◦]:= **unknowns = Cases$\left[\{ R_{1,2}, \overline{R}_{1,2}, C_1, \overline{C}_1 \}, (c \mid d \mid e \mid f)_{\$k,\_}, \infty \right]$ // Union**

Out[◦]= $\{ c_{2,1}, c_{2,2}, c_{2,3}, c_{2,4}, c_{2,5}, c_{2,6}, c_{2,7}, c_{2,8}, c_{2,9}, c_{2,10}, c_{2,11}, c_{2,12}, c_{2,13}, c_{2,14},$

$c_{2,15}, c_{2,16}, c_{2,17}, c_{2,18}, c_{2,19}, c_{2,20}, c_{2,21}, c_{2,22}, c_{2,23}, c_{2,24}, c_{2,25}, c_{2,26}, c_{2,27},$

$c_{2,28}, c_{2,29}, c_{2,30}, d_{2,1}, d_{2,2}, d_{2,3}, d_{2,4}, d_{2,5}, d_{2,6}, d_{2,7}, d_{2,8}, d_{2,9}, d_{2,10}, d_{2,11},$

$d_{2,12}, d_{2,13}, d_{2,14}, d_{2,15}, d_{2,16}, d_{2,17}, d_{2,18}, d_{2,19}, d_{2,20}, d_{2,21}, d_{2,22}, d_{2,23}, d_{2,24},$

$d_{2,25}, d_{2,26}, d_{2,27}, d_{2,28}, d_{2,29}, d_{2,30}, e_{2,1}, e_{2,2}, e_{2,3}, e_{2,4}, f_{2,1}, f_{2,2}, f_{2,3}, f_{2,4} \}$

In[ ]:= **Short[errors = CCF /@ Cases[RMoves, $a\_ == b\_ :\!\rightarrow a - b$], 25]**

Out[ ]//Short=

$\{\dfrac{1}{8}\big(-2\,T\,p_1^3\,x_1\,x_2\,x_3 + 4\,T^2\,p_1^3\,x_1\,x_2\,x_3 - 2\,T^3\,p_1^3\,x_1\,x_2\,x_3 - 4\,T^2\,p_1^2\,p_2\,x_1\,x_2\,x_3 + 4\,T^3\,p_1^2\,p_2\,x_1\,x_2\,x_3 +$

$2\,T^2\,p_1\,p_2^2\,x_1\,x_2\,x_3 - 2\,T^3\,p_1\,p_2^2\,x_1\,x_2\,x_3 - 2\,T^2\,p_1^2\,p_3\,x_1\,x_2\,x_3 + 2\,T^3\,p_1^2\,p_3\,x_1\,x_2\,x_3 + T^2\,p_1^3\,x_2^2\,x_3 -$

$2\,T^3\,p_1^3\,x_2^2\,x_3 + T^4\,p_1^3\,x_2^2\,x_3 + 3\,T^3\,p_1^2\,p_2\,x_2^2\,x_3 - 3\,T^4\,p_1^2\,p_2\,x_2^2\,x_3 + T^2\,p_1\,p_2^2\,x_2^2\,x_3 - 3\,T^3\,p_1\,p_2^2\,x_2^2\,x_3 +$

$2\,T^4\,p_1\,p_2^2\,x_2^2\,x_3 + 2\,T^3\,p_1\,p_2\,p_3\,x_2^2\,x_3 - 2\,T^4\,p_1\,p_2\,p_3\,x_2^2\,x_3 + 2\,T^2\,p_1^3\,x_1\,x_3^2 - 4\,T^3\,p_1^3\,x_1\,x_3^2 + 2\,T^4\,p_1^3\,x_1\,x_3^2 +$

$T^2\,p_1^2\,p_2\,x_1\,x_3^2 + T^3\,p_1^2\,p_2\,x_1\,x_3^2 - 2\,T^4\,p_1^2\,p_2\,x_1\,x_3^2 - T^2\,p_1^2\,p_3\,x_1\,x_3^2 + 5\,T^3\,p_1^2\,p_3\,x_1\,x_3^2 - 4\,T^4\,p_1^2\,p_3\,x_1\,x_3^2 -$

$2\,T^3\,p_1\,p_2\,p_3\,x_1\,x_3^2 + 2\,T^4\,p_1\,p_2\,p_3\,x_1\,x_3^2 + T^3\,p_1^3\,x_2\,x_3^2 - 2\,T^4\,p_1^3\,x_2\,x_3^2 + T^5\,p_1^3\,x_2\,x_3^2 - T^3\,p_1^2\,p_2\,x_2\,x_3^2 +$

$2\,T^4\,p_1^2\,p_2\,x_2\,x_3^2 - T^5\,p_1^2\,p_2\,x_2\,x_3^2 - 3\,T^3\,p_1\,p_2^2\,x_2\,x_3^2 + 3\,T^4\,p_1\,p_2^2\,x_2\,x_3^2 + T^3\,p_1^2\,p_3\,x_2\,x_3^2 + \,\ll 1963\gg +$

$72\,T\,p_1^2\,p_2\,x_2\,x_3^2\,c_{2,30} - 288\,T^2\,p_1^2\,p_2\,x_2\,x_3^2\,c_{2,30} + 432\,T^3\,p_1^2\,p_2\,x_2\,x_3^2\,c_{2,30} - 288\,T^4\,p_1^2\,p_2\,x_2\,x_3^2\,c_{2,30} +$

$72\,T^5\,p_1^2\,p_2\,x_2\,x_3^2\,c_{2,30} + 72\,T^2\,p_1\,p_2^2\,x_2\,x_3^2\,c_{2,30} - 216\,T^3\,p_1\,p_2^2\,x_2\,x_3^2\,c_{2,30} + 216\,T^4\,p_1\,p_2^2\,x_2\,x_3^2\,c_{2,30} -$

$72\,T^5\,p_1\,p_2^2\,x_2\,x_3^2\,c_{2,30} + 24\,T^3\,p_2^3\,x_2\,x_3^2\,c_{2,30} - 48\,T^4\,p_2^3\,x_2\,x_3^2\,c_{2,30} + 24\,T^5\,p_2^3\,x_2\,x_3^2\,c_{2,30} + 8\,p_1^3\,x_3^3\,c_{2,30} -$

$48\,T\,p_1^3\,x_3^3\,c_{2,30} + 120\,T^2\,p_1^3\,x_3^3\,c_{2,30} - 152\,T^3\,p_1^3\,x_3^3\,c_{2,30} + 96\,T^4\,p_1^3\,x_3^3\,c_{2,30} - 24\,T^5\,p_1^3\,x_3^3\,c_{2,30} +$

$24\,T\,p_1^2\,p_2\,x_3^3\,c_{2,30} - 120\,T^2\,p_1^2\,p_2\,x_3^3\,c_{2,30} + 240\,T^3\,p_1^2\,p_2\,x_3^3\,c_{2,30} - 240\,T^4\,p_1^2\,p_2\,x_3^3\,c_{2,30} +$

$120\,T^5\,p_1^2\,p_2\,x_3^3\,c_{2,30} - 24\,T^6\,p_1^2\,p_2\,x_3^3\,c_{2,30} + 24\,T^2\,p_1\,p_2^2\,x_3^3\,c_{2,30} - 96\,T^3\,p_1\,p_2^2\,x_3^3\,c_{2,30} +$

$144\,T^4\,p_1\,p_2^2\,x_3^3\,c_{2,30} - 96\,T^5\,p_1\,p_2^2\,x_3^3\,c_{2,30} + 24\,T^6\,p_1\,p_2^2\,x_3^3\,c_{2,30} + 24\,T^4\,p_1^2\,p_3\,x_3^3\,c_{2,30} -$

$48\,T^5\,p_1^2\,p_3\,x_3^3\,c_{2,30} + 24\,T^6\,p_1^2\,p_3\,x_3^3\,c_{2,30} - 24\,T^4\,p_2^2\,p_3\,x_3^3\,c_{2,30} + 48\,T^5\,p_2^2\,p_3\,x_3^3\,c_{2,30} - 24\,T^6\,p_2^2\,p_3\,x_3^3\,c_{2,30} +$

$24\,T^5\,p_1\,p_3^2\,x_3^3\,c_{2,30} - 24\,T^6\,p_1\,p_3^2\,x_3^3\,c_{2,30} - 24\,T^5\,p_2\,p_3^2\,x_3^3\,c_{2,30} + 24\,T^6\,p_2\,p_3^2\,x_3^3\,c_{2,30}\big),$

$\dfrac{-T^2\,p_1^2\,x_1\,x_2 + \ll 638\gg + \ll 1\gg}{8\,T^3},\ \ll 5\gg,$

$\dfrac{\ll 1\gg}{8\,T^3},$

$\dfrac{2\,T - 8\,T^2 + \ll 167\gg + 8\,p_1^3\,x_1^3\,e_{2,4}}{8\,T^3}\}$

In[ ]:= **Short[#, 10] &[eqns =**
 Thread[0 == Union @@ (CoefficientRules[#, $\{x_1, x_2, x_3, p_1, p_2, p_3\}$]〚 ;; , 2〛 & /@ errors)]]

Out[ ]//Short=

$\{0 == T\,c_{2,4} - T^2\,c_{2,4},\ 0 == -T\,c_{2,4} + T^2\,c_{2,4},\ 0 == T^2\,c_{2,4} - T^3\,c_{2,4},$

$\ll 213\gg,\ 0 == -\dfrac{1}{4} + \dfrac{T}{4} - c_{2,15} + 3\,T\,c_{2,15} - 3\,T^2\,c_{2,15} + T^3\,c_{2,15} + c_{2,16} - 2\,T\,c_{2,16} +$

$T^2\,c_{2,16} - c_{2,17} + T\,c_{2,17} + c_{2,18} + T^3\,d_{2,18} - T^2\,d_{2,22} + T^3\,d_{2,22} + T\,d_{2,26} - 2\,T^2\,d_{2,26} +$

$T^3\,d_{2,26} - d_{2,30} + 3\,T\,d_{2,30} - 3\,T^2\,d_{2,30} + T^3\,d_{2,30} - f_{2,4} + 3\,T\,f_{2,4} - 3\,T^2\,f_{2,4} + T^3\,f_{2,4},$

$0 == \dfrac{5\,T}{4} - \dfrac{T^2}{2} + d_{2,2} + T\,d_{2,3} + d_{2,4} + T\,d_{2,5} - 2\,T\,d_{2,7} - 4\,T^2\,d_{2,8} + d_{2,10} - 2\,T\,d_{2,10} + 2\,T\,d_{2,11} -$

$4\,T^2\,d_{2,11} + 2\,d_{2,13} - 2\,T\,d_{2,13} + 4\,T\,d_{2,14} - 4\,T^2\,d_{2,14} + 6\,T^2\,d_{2,17} + 18\,T^3\,d_{2,18} -$

$4\,T\,d_{2,21} + 6\,T^2\,d_{2,21} - 12\,T^2\,d_{2,22} + 18\,T^3\,d_{2,22} + 2\,d_{2,25} - 8\,T\,d_{2,25} + 6\,T^2\,d_{2,25} +$

$6\,T\,d_{2,26} - 24\,T^2\,d_{2,26} + 18\,T^3\,d_{2,26} + 6\,d_{2,29} - 12\,T\,d_{2,29} + 6\,T^2\,d_{2,29} + 18\,T\,d_{2,30} -$

$36\,T^2\,d_{2,30} + 18\,T^3\,d_{2,30} + T\,f_{2,2} + 4\,T\,f_{2,3} - 4\,T^2\,f_{2,3} + 18\,T\,f_{2,4} - 36\,T^2\,f_{2,4} + 18\,T^3\,f_{2,4}\}$

$In[\circ]:=$ **{sol} = Solve[eqns, unknowns]**

Solve: Equations may not give solutions for all "solve" variables.

$Out[\circ]=$ $\left\{\left\{ c_{2,1} \to -\dfrac{c_{2,2}}{2} - \dfrac{c_{2,5}}{2},\ c_{2,3} \to -T\,c_{2,2} - c_{2,5},\ c_{2,4} \to 0,\ c_{2,6} \to 0,\ c_{2,7} \to -\dfrac{1}{2}\,(1+T)\,c_{2,10} - c_{2,11}, \right.\right.$

$c_{2,8} \to -\dfrac{1}{2}\,\left(T - T^2\right)\,c_{2,10} - (1 - T)\,c_{2,11},\ c_{2,9} \to 0,\ c_{2,12} \to 0,\ c_{2,13} \to 0,\ c_{2,14} \to 0,\ c_{2,15} \to 0,$

$c_{2,16} \to \dfrac{2+T}{24} - c_{2,26},\ c_{2,17} \to \dfrac{1}{24}\,\left(-1 - T + 2\,T^2\right) - (1 - T)\,c_{2,26},\ c_{2,18} \to \dfrac{1}{24}\,\left(T + 2\,T^2 - 3\,T^3\right),$

$c_{2,19} \to 0,\ c_{2,20} \to -\dfrac{1}{8},\ c_{2,21} \to \dfrac{1}{8}\,(1 + 2\,T),\ c_{2,22} \to -\dfrac{T^2}{4} - (1 - T)\,c_{2,26},\ c_{2,23} \to 0,\ c_{2,24} \to 0,$

$c_{2,25} \to -\dfrac{1}{8},\ c_{2,27} \to 0,\ c_{2,28} \to 0,\ c_{2,29} \to 0,\ c_{2,30} \to 0,\ d_{2,1} \to \dfrac{c_{2,2}}{2} + \dfrac{c_{2,5}}{2},\ d_{2,2} \to -c_{2,2},$

$d_{2,3} \to \dfrac{c_{2,2}}{T} + c_{2,5},\ d_{2,4} \to 0,\ d_{2,5} \to -c_{2,5},\ d_{2,6} \to 0,\ d_{2,7} \to -\dfrac{-1+T}{8\,T} - \dfrac{(1 - 3\,T)\,c_{2,10}}{2\,T} + \dfrac{c_{2,11}}{T},$

$d_{2,8} \to -\dfrac{1 - T}{8\,T^2} - \dfrac{\left(-1 + 3\,T - 2\,T^2\right)\,c_{2,10}}{2\,T^2} - \dfrac{(1 - T)\,c_{2,11}}{T^2},\ d_{2,9} \to 0,\ d_{2,10} \to \dfrac{1}{4} - c_{2,10},$

$d_{2,11} \to -\dfrac{1}{4\,T} - \dfrac{(-1 + T)\,c_{2,10}}{T} - \dfrac{c_{2,11}}{T},\ d_{2,12} \to 0,\ d_{2,13} \to 0,\ d_{2,14} \to 0,\ d_{2,15} \to 0,$

$d_{2,16} \to -\dfrac{2+T}{24\,T} + \dfrac{c_{2,26}}{T},\ d_{2,17} \to -\dfrac{-5 + T + 4\,T^2}{24\,T^2} - \dfrac{(1 - T)\,c_{2,26}}{T^2},\ d_{2,18} \to -\dfrac{3 - 2\,T - T^2}{24\,T^3},\ d_{2,19} \to 0,$

$d_{2,20} \to -\dfrac{1}{8},\ d_{2,21} \to -\dfrac{-2 - T}{8\,T},\ d_{2,22} \to -\dfrac{1 + T^2}{8\,T^2} - \dfrac{(1 - T)\,c_{2,26}}{T^2},\ d_{2,23} \to 0,\ d_{2,24} \to 0,\ d_{2,25} \to -\dfrac{1}{8},$

$d_{2,26} \to -\dfrac{-1 - T}{8\,T} - \dfrac{c_{2,26}}{T},\ d_{2,27} \to 0,\ d_{2,28} \to 0,\ d_{2,29} \to 0,\ d_{2,30} \to 0,\ e_{2,1} \to -\dfrac{c_{2,2}}{2} - \dfrac{c_{2,5}}{2},$

$\left.\left. e_{2,2} \to -c_{2,10},\ e_{2,3} \to 0,\ e_{2,4} \to 0,\ f_{2,1} \to \dfrac{c_{2,2}}{2} + \dfrac{c_{2,5}}{2},\ f_{2,2} \to -\dfrac{1}{4} + c_{2,10},\ f_{2,3} \to 0,\ f_{2,4} \to 0 \right\}\right\}$

$In[\circ]:=$ **sol /. ($a\_ \to b\_$) :$\to$ ($a = b$)**

$Out[\circ]=$ $\left\{ -\dfrac{c_{2,2}}{2} - \dfrac{c_{2,5}}{2}, \ -T\, c_{2,2} - c_{2,5}, \ 0, \ 0, \ -\dfrac{1}{2}\,(1 + T)\, c_{2,10} - c_{2,11}, \ -\dfrac{1}{2}\,\left(T - T^2\right) c_{2,10} - (1 - T)\, c_{2,11}, \right.$

$\qquad 0, \ 0, \ 0, \ 0, \ 0, \ \dfrac{2 + T}{24} - c_{2,26}, \ \dfrac{1}{24}\,\left(-1 - T + 2\,T^2\right) - (1 - T)\, c_{2,26}, \ \dfrac{1}{24}\,\left(T + 2\,T^2 - 3\,T^3\right), \ 0, \ -\dfrac{1}{8},$

$\qquad \dfrac{1}{8}\,(1 + 2\,T), \ -\dfrac{T^2}{4} - (1 - T)\, c_{2,26}, \ 0, \ 0, \ -\dfrac{1}{8}, \ 0, \ 0, \ 0, \ 0, \ \dfrac{c_{2,2}}{2} + \dfrac{c_{2,5}}{2}, \ -c_{2,2}, \ \dfrac{c_{2,2}}{T} + c_{2,5}, \ 0,$

$\qquad -c_{2,5}, \ 0, \ -\dfrac{-1 + T}{8\,T} - \dfrac{(1 - 3\,T)\, c_{2,10}}{2\,T} + \dfrac{c_{2,11}}{T}, \ -\dfrac{1 - T}{8\,T^2} - \dfrac{\left(-1 + 3\,T - 2\,T^2\right) c_{2,10}}{2\,T^2} - \dfrac{(1 - T)\, c_{2,11}}{T^2},$

$\qquad 0, \ \dfrac{1}{4} - c_{2,10}, \ -\dfrac{1}{4\,T} - \dfrac{(-1 + T)\, c_{2,10}}{T} - \dfrac{c_{2,11}}{T}, \ 0, \ 0, \ 0, \ 0, \ -\dfrac{2 + T}{24\,T} + \dfrac{c_{2,26}}{T},$

$\qquad -\dfrac{-5 + T + 4\,T^2}{24\,T^2} - \dfrac{(1 - T)\, c_{2,26}}{T^2}, \ -\dfrac{3 - 2\,T - T^2}{24\,T^3}, \ 0, \ -\dfrac{1}{8}, \ -\dfrac{-2 - T}{8\,T}, \ -\dfrac{1 + T^2}{8\,T^2} - \dfrac{(1 - T)\, c_{2,26}}{T^2}, \ 0, \ 0,$

$\qquad \left. -\dfrac{1}{8}, \ -\dfrac{-1 - T}{8\,T} - \dfrac{c_{2,26}}{T}, \ 0, \ 0, \ 0, \ 0, \ -\dfrac{c_{2,2}}{2} - \dfrac{c_{2,5}}{2}, \ -c_{2,10}, \ 0, \ 0, \ \dfrac{c_{2,2}}{2} + \dfrac{c_{2,5}}{2}, \ -\dfrac{1}{4} + c_{2,10}, \ 0, \ 0 \right\}$

$In[\circ]:=$ **Cases$\left[\{R_{1,2}, \overline{R}_{1,2}, C_1, \overline{C}_1\}, (c \mid d \mid e \mid f)_{\$k,\_}, \infty\right]$ // Union**

$Out[\circ]=$ $\{c_{2,2}, c_{2,5}, c_{2,10}, c_{2,11}, c_{2,26}\}$

$In[\circ]:=$ **{Z1, Z2} = ZF /@ {Knot[10, 106], Knot[12, NonAlternating, 369]}**

KnotTheory: Loading precomputed data in KnotTheory/12N.dts.

KnotTheory: The GaussCode to PD conversion was written by Siddarth Sankaran at the University of Toronto in the summer of 2005.

$Out[\circ]=$ $\left\{ \mathbb{E}_{\{\} \to \{1\}}\left[\dfrac{T^4}{1 - 4\,T + 9\,T^2 - 15\,T^3 + 17\,T^4 - 15\,T^5 + 9\,T^6 - 4\,T^7 + T^8}\right], \right.$

$\quad 0, \ \in$Series$\left[0, \left(3 - 20\,T + 69\,T^2 - 161\,T^3 + 272\,T^4 - 328\,T^5 + 225\,T^6 + 92\,T^7 - \right.\right.$

$\qquad \left. 548\,T^8 + 952\,T^9 - 1113\,T^{10} + 980\,T^{11} - 668\,T^{12} + 349\,T^{13} - 135\,T^{14} + 36\,T^{15} - 5\,T^{16}\right) /$

$\qquad \left(2 - 16\,T + 68\,T^2 - 204\,T^3 + 470\,T^4 - 872\,T^5 + 1338\,T^6 - 1720\,T^7 + 1870\,T^8 - 1720\,T^9 + \right.$

$\qquad \left. 1338\,T^{10} - 872\,T^{11} + 470\,T^{12} - 204\,T^{13} + 68\,T^{14} - 16\,T^{15} + 2\,T^{16}\right),$

$\qquad \left(3 - 40\,T + 264\,T^2 - 1128\,T^3 + 3437\,T^4 - 7552\,T^5 + 10\,297\,T^6 + 2304\,T^7 - 67\,324\,T^8 + 259\,472\,T^9 - \right.$

$\qquad 699\,066\,T^{10} + 1\,539\,252\,T^{11} - 2\,919\,131\,T^{12} + 4\,882\,760\,T^{13} - 7\,290\,870\,T^{14} + 9\,779\,044\,T^{15} -$

$\qquad 11\,816\,854\,T^{16} + 12\,877\,354\,T^{17} - 12\,651\,386\,T^{18} + 11\,191\,592\,T^{19} - 8\,896\,165\,T^{20} + 6\,336\,738\,T^{21} -$

$\qquad 4\,030\,390\,T^{22} + 2\,278\,962\,T^{23} - 1\,139\,320\,T^{24} + 500\,046\,T^{25} - 190\,857\,T^{26} + 62\,504\,T^{27} - 17\,215\,T^{28} +$

$\qquad 3862\,T^{29} - 668\,T^{30} + 80\,T^{31} - 5\,T^{32} - 32\,c_{2,2} + 480\,T\, c_{2,2} - 3696\,T^2\, c_{2,2} + 19\,448\,T^3\, c_{2,2} -$

$\qquad 78\,192\,T^4\, c_{2,2} + 254\,496\,T^5\, c_{2,2} - 693\,960\,T^6\, c_{2,2} + 1\,620\,216\,T^7\, c_{2,2} - 3\,284\,656\,T^8\, c_{2,2} +$

$\qquad 5\,831\,784\,T^9\, c_{2,2} - 9\,103\,728\,T^{10}\, c_{2,2} + 12\,483\,640\,T^{11}\, c_{2,2} - 14\,922\,472\,T^{12}\, c_{2,2} + 15\,241\,728\,T^{13}\, c_{2,2} -$

$\qquad 12\,646\,416\,T^{14}\, c_{2,2} + 7\,205\,208\,T^{15}\, c_{2,2} - 7\,205\,208\,T^{17}\, c_{2,2} + 12\,646\,416\,T^{18}\, c_{2,2} - 15\,241\,728\,T^{19}\, c_{2,2} +$

$\qquad 14\,922\,472\,T^{20}\, c_{2,2} - 12\,483\,640\,T^{21}\, c_{2,2} + 9\,103\,728\,T^{22}\, c_{2,2} - 5\,831\,784\,T^{23}\, c_{2,2} + 3\,284\,656\,T^{24}\, c_{2,2} -$

$\qquad 1\,620\,216\,T^{25}\, c_{2,2} + 693\,960\,T^{26}\, c_{2,2} - 254\,496\,T^{27}\, c_{2,2} + 78\,192\,T^{28}\, c_{2,2} - 19\,448\,T^{29}\, c_{2,2} +$

$\qquad 3696\,T^{30}\, c_{2,2} - 480\,T^{31}\, c_{2,2} + 32\,T^{32}\, c_{2,2} - 32\,c_{2,5} + 480\,T\, c_{2,5} - 3696\,T^2\, c_{2,5} + 19\,448\,T^3\, c_{2,5} -$

$\qquad 78\,192\,T^4\, c_{2,5} + 254\,496\,T^5\, c_{2,5} - 693\,960\,T^6\, c_{2,5} + 1\,620\,216\,T^7\, c_{2,5} - 3\,284\,656\,T^8\, c_{2,5} +$

$\qquad 5\,831\,784\,T^9\, c_{2,5} - 9\,103\,728\,T^{10}\, c_{2,5} + 12\,483\,640\,T^{11}\, c_{2,5} - 14\,922\,472\,T^{12}\, c_{2,5} + 15\,241\,728\,T^{13}\, c_{2,5} -$

$12\,646\,416\,T^{14}\,c_{2,5} + 7\,205\,208\,T^{15}\,c_{2,5} - 7\,205\,208\,T^{17}\,c_{2,5} + 12\,646\,416\,T^{18}\,c_{2,5} - 15\,241\,728\,T^{19}\,c_{2,5} +$

$14\,922\,472\,T^{20}\,c_{2,5} - 12\,483\,640\,T^{21}\,c_{2,5} + 9\,103\,728\,T^{22}\,c_{2,5} - 5\,831\,784\,T^{23}\,c_{2,5} + 3\,284\,656\,T^{24}\,c_{2,5} -$

$1\,620\,216\,T^{25}\,c_{2,5} + 693\,960\,T^{26}\,c_{2,5} - 254\,496\,T^{27}\,c_{2,5} + 78\,192\,T^{28}\,c_{2,5} - 19\,448\,T^{29}\,c_{2,5} +$

$3696\,T^{30}\,c_{2,5} - 480\,T^{31}\,c_{2,5} + 32\,T^{32}\,c_{2,5} - 24\,c_{2,10} + 352\,T\,c_{2,10} - 2648\,T^2\,c_{2,10} + 13\,592\,T^3\,c_{2,10} -$

$53\,208\,T^4\,c_{2,10} + 168\,192\,T^5\,c_{2,10} - 443\,688\,T^6\,c_{2,10} + 995\,864\,T^7\,c_{2,10} - 1\,920\,832\,T^8\,c_{2,10} +$

$3\,187\,896\,T^9\,c_{2,10} - 4\,506\,304\,T^{10}\,c_{2,10} + 5\,249\,976\,T^{11}\,c_{2,10} - 4\,549\,000\,T^{12}\,c_{2,10} + 1\,601\,312\,T^{13}\,c_{2,10} +$

$3\,879\,856\,T^{14}\,c_{2,10} - 11\,310\,184\,T^{15}\,c_{2,10} + 19\,225\,392\,T^{16}\,c_{2,10} - 25\,720\,600\,T^{17}\,c_{2,10} +$

$29\,172\,688\,T^{18}\,c_{2,10} - 28\,882\,144\,T^{19}\,c_{2,10} + 25\,295\,944\,T^{20}\,c_{2,10} - 19\,717\,304\,T^{21}\,c_{2,10} +$

$13\,701\,152\,T^{22}\,c_{2,10} - 8\,475\,672\,T^{23}\,c_{2,10} + 4\,648\,480\,T^{24}\,c_{2,10} - 2\,244\,568\,T^{25}\,c_{2,10} + 944\,232\,T^{26}\,c_{2,10} -$

$340\,800\,T^{27}\,c_{2,10} + 103\,176\,T^{28}\,c_{2,10} - 25\,304\,T^{29}\,c_{2,10} + 4744\,T^{30}\,c_{2,10} - 608\,T^{31}\,c_{2,10} + 40\,T^{32}\,c_{2,10}\big)\ /$

$\big(8 - 128\,T + 1056\,T^2 - 5984\,T^3 + 26\,064\,T^4 - 92\,544\,T^5 + 277\,584\,T^6 - 720\,096\,T^7 + 1\,642\,328\,T^8 -$

$3\,332\,448\,T^9 + 6\,069\,152\,T^{10} - 9\,986\,912\,T^{11} + 14\,922\,472\,T^{12} - 20\,322\,304\,T^{13} + 25\,292\,832\,T^{14} -$

$28\,820\,832\,T^{15} + 30\,099\,512\,T^{16} - 28\,820\,832\,T^{17} + 25\,292\,832\,T^{18} - 20\,322\,304\,T^{19} +$

$14\,922\,472\,T^{20} - 9\,986\,912\,T^{21} + 6\,069\,152\,T^{22} - 3\,332\,448\,T^{23} + 1\,642\,328\,T^{24} - 720\,096\,T^{25} +$

$277\,584\,T^{26} - 92\,544\,T^{27} + 26\,064\,T^{28} - 5984\,T^{29} + 1056\,T^{30} - 128\,T^{31} + 8\,T^{32}\big)\big]\Big],$

$\mathbb{E}_{\{\}\to\{1\}}\Big[\dfrac{T^4}{1 - 4\,T + 9\,T^2 - 15\,T^3 + 17\,T^4 - 15\,T^5 + 9\,T^6 - 4\,T^7 + T^8},$

0,

$\epsilon\text{Series}\Big[0,$

$\big(3 - 20\,T + 69\,T^2 - 161\,T^3 + 272\,T^4 - 328\,T^5 + 225\,T^6 + 92\,T^7 - 548\,T^8 +$

$952\,T^9 - 1113\,T^{10} + 980\,T^{11} - 668\,T^{12} + 349\,T^{13} - 135\,T^{14} + 36\,T^{15} - 5\,T^{16}\big)\ /$

$\big(2 - 16\,T + 68\,T^2 - 204\,T^3 + 470\,T^4 - 872\,T^5 + 1338\,T^6 - 1720\,T^7 + 1870\,T^8 - 1720\,T^9 +$

$1338\,T^{10} - 872\,T^{11} + 470\,T^{12} - 204\,T^{13} + 68\,T^{14} - 16\,T^{15} + 2\,T^{16}\big),$

$\big(3 - 40\,T + 264\,T^2 - 1120\,T^3 + 3333\,T^4 - 6896\,T^5 + 7641\,T^6 + 9944\,T^7 - 83\,404\,T^8 + 283\,088\,T^9 -$

$716\,082\,T^{10} + 1\,514\,140\,T^{11} - 2\,796\,883\,T^{12} + 4\,607\,952\,T^{13} - 6\,839\,214\,T^{14} + 9\,183\,044\,T^{15} -$

$11\,164\,950\,T^{16} + 12\,281\,354\,T^{17} - 12\,199\,730\,T^{18} + 10\,916\,784\,T^{19} - 8\,773\,917\,T^{20} + 6\,311\,626\,T^{21} -$

$4\,047\,406\,T^{22} + 2\,302\,578\,T^{23} - 1\,155\,400\,T^{24} + 507\,686\,T^{25} - 193\,513\,T^{26} + 63\,160\,T^{27} - 17\,319\,T^{28} +$

$3870\,T^{29} - 668\,T^{30} + 80\,T^{31} - 5\,T^{32} - 32\,c_{2,2} + 480\,T\,c_{2,2} - 3696\,T^2\,c_{2,2} + 19\,448\,T^3\,c_{2,2} -$

$78\,192\,T^4\,c_{2,2} + 254\,496\,T^5\,c_{2,2} - 693\,960\,T^6\,c_{2,2} + 1\,620\,216\,T^7\,c_{2,2} - 3\,284\,656\,T^8\,c_{2,2} +$

$5\,831\,784\,T^9\,c_{2,2} - 9\,103\,728\,T^{10}\,c_{2,2} + 12\,483\,640\,T^{11}\,c_{2,2} - 14\,922\,472\,T^{12}\,c_{2,2} + 15\,241\,728\,T^{13}\,c_{2,2} -$

$12\,646\,416\,T^{14}\,c_{2,2} + 7\,205\,208\,T^{15}\,c_{2,2} - 7\,205\,208\,T^{17}\,c_{2,2} + 12\,646\,416\,T^{18}\,c_{2,2} - 15\,241\,728\,T^{19}\,c_{2,2} +$

$14\,922\,472\,T^{20}\,c_{2,2} - 12\,483\,640\,T^{21}\,c_{2,2} + 9\,103\,728\,T^{22}\,c_{2,2} - 5\,831\,784\,T^{23}\,c_{2,2} + 3\,284\,656\,T^{24}\,c_{2,2} -$

$1\,620\,216\,T^{25}\,c_{2,2} + 693\,960\,T^{26}\,c_{2,2} - 254\,496\,T^{27}\,c_{2,2} + 78\,192\,T^{28}\,c_{2,2} - 19\,448\,T^{29}\,c_{2,2} +$

$3696\,T^{30}\,c_{2,2} - 480\,T^{31}\,c_{2,2} + 32\,T^{32}\,c_{2,2} - 32\,c_{2,5} + 480\,T\,c_{2,5} - 3696\,T^2\,c_{2,5} + 19\,448\,T^3\,c_{2,5} -$

$78\,192\,T^4\,c_{2,5} + 254\,496\,T^5\,c_{2,5} - 693\,960\,T^6\,c_{2,5} + 1\,620\,216\,T^7\,c_{2,5} - 3\,284\,656\,T^8\,c_{2,5} +$

$5\,831\,784\,T^9\,c_{2,5} - 9\,103\,728\,T^{10}\,c_{2,5} + 12\,483\,640\,T^{11}\,c_{2,5} - 14\,922\,472\,T^{12}\,c_{2,5} + 15\,241\,728\,T^{13}\,c_{2,5} -$

$12\,646\,416\,T^{14}\,c_{2,5} + 7\,205\,208\,T^{15}\,c_{2,5} - 7\,205\,208\,T^{17}\,c_{2,5} + 12\,646\,416\,T^{18}\,c_{2,5} - 15\,241\,728\,T^{19}\,c_{2,5} +$

$14\,922\,472\,T^{20}\,c_{2,5} - 12\,483\,640\,T^{21}\,c_{2,5} + 9\,103\,728\,T^{22}\,c_{2,5} - 5\,831\,784\,T^{23}\,c_{2,5} + 3\,284\,656\,T^{24}\,c_{2,5} -$

$1\,620\,216\,T^{25}\,c_{2,5} + 693\,960\,T^{26}\,c_{2,5} - 254\,496\,T^{27}\,c_{2,5} + 78\,192\,T^{28}\,c_{2,5} - 19\,448\,T^{29}\,c_{2,5} +$

$3696\,T^{30}\,c_{2,5} - 480\,T^{31}\,c_{2,5} + 32\,T^{32}\,c_{2,5} - 24\,c_{2,10} + 352\,T\,c_{2,10} - 2648\,T^2\,c_{2,10} + 13\,592\,T^3\,c_{2,10} -$

$53\,208\,T^4\,c_{2,10} + 168\,192\,T^5\,c_{2,10} - 443\,688\,T^6\,c_{2,10} + 995\,864\,T^7\,c_{2,10} - 1\,920\,832\,T^8\,c_{2,10} +$

$3\,187\,896\,T^9\,c_{2,10} - 4\,506\,304\,T^{10}\,c_{2,10} + 5\,249\,976\,T^{11}\,c_{2,10} - 4\,549\,000\,T^{12}\,c_{2,10} + 1\,601\,312\,T^{13}\,c_{2,10} +$

$3\,879\,856\;T^{14}\,c_{2,10} - 11\,310\,184\;T^{15}\,c_{2,10} + 19\,225\,392\;T^{16}\,c_{2,10} - 25\,720\,600\;T^{17}\,c_{2,10} +$
$29\,172\,688\;T^{18}\,c_{2,10} - 28\,882\,144\;T^{19}\,c_{2,10} + 25\,295\,944\;T^{20}\,c_{2,10} - 19\,717\,304\;T^{21}\,c_{2,10} +$
$13\,701\,152\;T^{22}\,c_{2,10} - 8\,475\,672\;T^{23}\,c_{2,10} + 4\,648\,480\;T^{24}\,c_{2,10} - 2\,244\,568\;T^{25}\,c_{2,10} + 944\,232\;T^{26}\,c_{2,10} -$
$340\,800\;T^{27}\,c_{2,10} + 103\,176\;T^{28}\,c_{2,10} - 25\,304\;T^{29}\,c_{2,10} + 4744\;T^{30}\,c_{2,10} - 608\;T^{31}\,c_{2,10} + 40\;T^{32}\,c_{2,10}\Big) \Big/$

$\Big(8 - 128\,T + 1056\,T^2 - 5984\,T^3 + 26\,064\,T^4 - 92\,544\,T^5 + 277\,584\,T^6 - 720\,096\,T^7 + 1\,642\,328\,T^8 -$
$3\,332\,448\,T^9 + 6\,069\,152\,T^{10} - 9\,986\,912\,T^{11} + 14\,922\,472\,T^{12} - 20\,322\,304\,T^{13} + 25\,292\,832\,T^{14} -$
$28\,820\,832\,T^{15} + 30\,099\,512\,T^{16} - 28\,820\,832\,T^{17} + 25\,292\,832\,T^{18} - 20\,322\,304\,T^{19} +$
$14\,922\,472\,T^{20} - 9\,986\,912\,T^{21} + 6\,069\,152\,T^{22} - 3\,332\,448\,T^{23} + 1\,642\,328\,T^{24} - 720\,096\,T^{25} +$
$277\,584\,T^{26} - 92\,544\,T^{27} + 26\,064\,T^{28} - 5984\,T^{29} + 1056\,T^{30} - 128\,T^{31} + 8\,T^{32}\Big)\Big]\Big]\Big\}$

In[ ]:= **{Z1〚3, 2〛 == Z2〚3, 2〛, Z1〚3, 3〛 − Z2〚3, 3〛} // Simplify**

Out[ ]= $\left\{\text{True}, \; -\dfrac{(-1+T)^4\,T^3\,\left(1 - 3\,T + 2\,T^2 + 5\,T^3 - 12\,T^4 + 18\,T^5 - 12\,T^6 + 5\,T^7 + 2\,T^8 - 3\,T^9 + T^{10}\right)}{\left(1 - T + T^2\right)\left(1 - 3\,T + 5\,T^2 - 7\,T^3 + 5\,T^4 - 3\,T^5 + T^6\right)^3}\right\}$

In[ ]:= **{C₁, C̄₁, CF[CF[Rp₁,₂ /. T → T⁻¹]〚3, 3〛 − CF[R̄p₁,₂]〚3, 3〛]} /.**
{c₂,₂ → 0, c₂,₅ → 0, c₂,₁₀ → 1 / 8, c₂,₁₁ → −1 / 8, c₂,₂₆ → 1 / 8}

Out[ ]= $\left\{\mathbb{E}_{\{\}\to\{1\}}\left[\sqrt{T}, \; 0, \; \epsilon\text{Series}\left[0, \dfrac{p_1\,x_1}{2}, \; -\dfrac{1}{8}\,p_1\,x_1\right]\right],\right.$

$\left.\mathbb{E}_{\{\}\to\{1\}}\left[\dfrac{1}{\sqrt{T}}, \; 0, \; \epsilon\text{Series}\left[0, -\dfrac{1}{2}\,p_1\,x_1, \; -\dfrac{1}{8}\,p_1\,x_1\right]\right], \; 0\right\}$

In[ ]:= **{c₂,₂ = 0, c₂,₅ = 0, c₂,₁₀ = 1 / 8, c₂,₁₁ = −1 / 8, c₂,₂₆ = 1 / 8};**
{R₁,₂, R̄₁,₂, R₁,₂ /. T → T⁻¹, C₁, C̄₁} // CF // Column

Out[ ]= $\mathbb{E}_{\{\}\to\{1,2\}}\left[\sqrt{T}, \; (-1+T)\,p_1\,x_2 + (1-T)\,p_2\,x_2,\right.$

$\epsilon\text{Series}\left[0, \dfrac{1}{4}\,(-1+T)\,p_1^2\,x_1\,x_2 - \dfrac{1}{2}\,T\,p_1\,p_2\,x_1\,x_2 + \dfrac{1}{4}\,\left(T - T^2\right)\,p_1^2\,x_2^2 + \dfrac{1}{2}\,T^2\,p_1\,p_2\,x_2^2,\right.$

$\dfrac{1}{16}\,(3 - 3\,T)\,p_1^2\,x_1\,x_2 + \dfrac{1}{8}\,T\,p_1\,p_2\,x_1\,x_2 + \dfrac{1}{6}\,(-1+T)\,p_1^3\,x_1^2\,x_2 - \dfrac{1}{8}\,T\,p_1^2\,p_2\,x_1^2\,x_2 +$

$\dfrac{1}{16}\,\left(-T + T^2\right)\,p_1^2\,x_2^2 - \dfrac{1}{8}\,T\,p_1\,p_2\,x_2^2 + \dfrac{1}{24}\,\left(-4 + 11\,T - 7\,T^2\right)\,p_1^3\,x_1\,x_2^2 + \dfrac{1}{8}\,\left(-T + 4\,T^2\right)\,p_1^2\,p_2\,x_1\,x_2^2 -$

$\left.\left.\dfrac{1}{8}\,T^2\,p_1\,p_2^2\,x_1\,x_2^2 + \dfrac{1}{24}\,\left(T - 4\,T^2 + 3\,T^3\right)\,p_1^3\,x_2^3 + \dfrac{1}{8}\,\left(T - T^2 - 2\,T^3\right)\,p_1^2\,p_2\,x_2^3 + \dfrac{1}{8}\,T^2\,p_1\,p_2^2\,x_2^3\right]\right]$

$\mathbb{E}_{\{\}\to\{1,2\}}\left[\dfrac{1}{\sqrt{T}}, \; \dfrac{(1-T)\,p_1\,x_2}{T} + \dfrac{(-1+T)\,p_2\,x_2}{T}, \; \epsilon\text{Series}\left[0, \dfrac{(-1+T)\,p_1^2\,x_1\,x_2}{4\,T} + \dfrac{p_1\,p_2\,x_1\,x_2}{2\,T} + \dfrac{(1-T)\,p_1^2\,x_2^2}{4\,T^2} - \dfrac{p_1\,p_2\,x_2^2}{2\,T^2},\right.\right.$

$\dfrac{(-3+3\,T)\,p_1^2\,x_1\,x_2}{16\,T} + \dfrac{p_1\,p_2\,x_1\,x_2}{8\,T} + \dfrac{(1-T)\,p_1^3\,x_1^2\,x_2}{6\,T} - \dfrac{p_1^2\,p_2\,x_1^2\,x_2}{8\,T} + \dfrac{(1-T)\,p_1^2\,x_2^2}{16\,T^2} - \dfrac{p_1\,p_2\,x_2^2}{8\,T} +$

$\left.\left.\dfrac{(-7+11\,T-4\,T^2)\,p_1^3\,x_1\,x_2^2}{24\,T^2} + \dfrac{(4-T)\,p_1^2\,p_2\,x_1\,x_2^2}{8\,T^2} - \dfrac{p_1\,p_2^2\,x_1\,x_2^2}{8\,T^2} + \dfrac{(3-4\,T+T^2)\,p_1^3\,x_2^3}{24\,T^3} + \dfrac{(-2-T+T^2)\,p_1^2\,p_2\,x_2^3}{8\,T^3} + \dfrac{p_1\,p_2^2\,x_2^3}{8\,T^2}\right]\right]$

$\mathbb{E}_{\{\}\to\{1,2\}}\left[\sqrt{\dfrac{1}{T}}, \; \dfrac{(1-T)\,p_1\,x_2}{T} + \dfrac{(-1+T)\,p_2\,x_2}{T}, \; \epsilon\text{Series}\left[0, \dfrac{(1-T)\,p_1^2\,x_1\,x_2}{4\,T} - \dfrac{p_1\,p_2\,x_1\,x_2}{2\,T} + \dfrac{(-1+T)\,p_1^2\,x_2^2}{4\,T^2} + \dfrac{p_1\,p_2\,x_2^2}{2\,T^2},\right.\right.$

$\dfrac{(-3+3\,T)\,p_1^2\,x_1\,x_2}{16\,T} + \dfrac{p_1\,p_2\,x_1\,x_2}{8\,T} + \dfrac{(1-T)\,p_1^3\,x_1^2\,x_2}{6\,T} - \dfrac{p_1^2\,p_2\,x_1^2\,x_2}{8\,T} + \dfrac{(1-T)\,p_1^2\,x_2^2}{16\,T^2} - \dfrac{p_1\,p_2\,x_2^2}{8\,T} +$

$\left.\left.\dfrac{(-7+11\,T-4\,T^2)\,p_1^3\,x_1\,x_2^2}{24\,T^2} + \dfrac{(4-T)\,p_1^2\,p_2\,x_1\,x_2^2}{8\,T^2} - \dfrac{p_1\,p_2^2\,x_1\,x_2^2}{8\,T^2} + \dfrac{(3-4\,T+T^2)\,p_1^3\,x_2^3}{24\,T^3} + \dfrac{(-2-T+T^2)\,p_1^2\,p_2\,x_2^3}{8\,T^3} + \dfrac{p_1\,p_2^2\,x_2^3}{8\,T^2}\right]\right]$

$\mathbb{E}_{\{\}\to\{1\}}\left[\sqrt{T}, \; 0, \; \epsilon\text{Series}\left[0, \dfrac{p_1\,x_1}{2}, \; -\dfrac{1}{8}\,p_1\,x_1\right]\right]$

$\mathbb{E}_{\{\}\to\{1\}}\left[\dfrac{1}{\sqrt{T}}, \; 0, \; \epsilon\text{Series}\left[0, -\dfrac{1}{2}\,p_1\,x_1, \; -\dfrac{1}{8}\,p_1\,x_1\right]\right]$

$\mathit{In[\circ]:=}$ **CF** $\left[\mathbf{R_{1,2}} \;/.\; \mathbf{T} \to \mathbf{T^{-1}} \right]$ **〚3, 3〛** − **CF** $[\overline{\mathbf{R}}_{\mathbf{1,2}}]$ **〚3, 3〛**

$\mathit{Out[\circ]=}$ 0

$\mathit{In[\circ]:=}$ **Factor** /@ $\mathbf{Rp_{1,2}}$**〚3〛**

$\mathit{Out[\circ]=}$ $\in$Series$\left[0, \; \dfrac{1}{4} \; p_1 \; (-p_1 + T \, p_1 + 2 \, p_2) \; x_2 \; (-x_1 + T \, x_2) \right.$,

$-\dfrac{1}{48} \, p_1 \, x_2 \, \left(-3 \, p_1 \, x_1 + 3 \, T \, p_1 \, x_1 - 6 \, p_2 \, x_1 + 2 \, p_1^2 \, x_1^2 - 2 \, T \, p_1^2 \, x_1^2 + 6 \, p_1 \, p_2 \, x_1^2 - 6 \, p_1 \, x_2 + 9 \, T \, p_1 \, x_2 - \right.$

$3 \, T^2 \, p_1 \, x_2 + 6 \, p_2 \, x_2 + 8 \, p_1^2 \, x_1 \, x_2 - 4 \, T \, p_1^2 \, x_1 \, x_2 - 4 \, T^2 \, p_1^2 \, x_1 \, x_2 - 6 \, p_1 \, p_2 \, x_1 \, x_2 - 12 \, T \, p_1 \, p_2 \, x_1 \, x_2 +$

$\left. 6 \, p_2^2 \, x_1 \, x_2 - 2 \, T \, p_1^2 \, x_2^2 - 4 \, T^2 \, p_1^2 \, x_2^2 + 6 \, T^3 \, p_1^2 \, x_2^2 + 6 \, p_1 \, p_2 \, x_2^2 - 6 \, T \, p_1 \, p_2 \, x_2^2 + 12 \, T^2 \, p_1 \, p_2 \, x_2^2 - 6 \, p_2^2 \, x_2^2 \right) \Big]$

$\mathit{In[\circ]:=}$ **Simplify** /@ $\mathbf{Rp_{1,2}}$**〚3〛**

$\mathit{Out[\circ]=}$ $\in$Series$\left[0, \; \dfrac{1}{4} \; p_1 \; ((-1 + T) \, p_1 + 2 \, p_2) \; x_2 \; (-x_1 + T \, x_2) \right.$,

$-\dfrac{1}{48} \, p_1 \, x_2 \, \left(6 \, p_2 \, (x_1 - x_2) \, (-1 + p_2 \, x_2) - 2 \, (-1 + T) \, p_1^2 \, \left(x_1^2 + 2 \, (2 + T) \, x_1 \, x_2 - T \, (1 + 3 \, T) \, x_2^2 \right) + \right.$

$\left. 3 \, p_1 \, \left(2 \, p_2 \, x_1^2 + x_1 \, (-1 + T - 2 \, (1 + 2 \, T) \, p_2 \, x_2) + x_2 \, \left(-2 + 3 \, T - T^2 + 2 \, \left(1 - T + 2 \, T^2 \right) \, p_2 \, x_2 \right) \right) \right) \Big]$

$\mathit{In[\circ]:=}$ **RMoves**

$\mathit{Out[\circ]=}$ {True, True, True, True, True, True, True, True, True}

Solving for R, C, $k = 3$

$\mathit{In[\circ]:=}$ **\$k = 3;**

$\{\mathbf{R_{1,2}}, \; \mathbf{C_1}\}$

$\mathit{Out[\circ]=}$ $\left\{ \mathbb{E}_{\{\} \to \{1,2\}} \left[\sqrt{T} \,, \; (-1 + T) \, p_1 \, x_2 + (1 - T) \, p_2 \, x_2 \right. \right.$,

$\in$Series$\left[0, \; \dfrac{1}{4} \, (-1 + T) \, p_1^2 \, x_1 \, x_2 - \dfrac{1}{2} \, T \, p_1 \, p_2 \, x_1 \, x_2 + \dfrac{1}{4} \, \left(T - T^2 \right) \, p_1^2 \, x_2^2 + \dfrac{1}{2} \, T^2 \, p_1 \, p_2 \, x_2^2 \right.$,

$\dfrac{1}{16} \, (3 - 3 \, T) \, p_1^2 \, x_1 \, x_2 + \dfrac{1}{8} \, T \, p_1 \, p_2 \, x_1 \, x_2 + \dfrac{1}{6} \, (-1 + T) \, p_1^3 \, x_1^2 \, x_2 - \dfrac{1}{8} \, T \, p_1^2 \, p_2 \, x_1^2 \, x_2 +$

$\dfrac{1}{16} \, \left(-T + T^2 \right) \, p_1^2 \, x_2^2 - \dfrac{1}{8} \, T \, p_1 \, p_2 \, x_2^2 + \dfrac{1}{24} \, \left(-4 + 11 \, T - 7 \, T^2 \right) \, p_1^3 \, x_1 \, x_2^2 + \dfrac{1}{8} \, \left(-T + 4 \, T^2 \right) \, p_1^2 \, p_2 \, x_1 \, x_2^2 -$

$\dfrac{1}{8} \, T^2 \, p_1 \, p_2^2 \, x_1 \, x_2^2 + \dfrac{1}{24} \, \left(T - 4 \, T^2 + 3 \, T^3 \right) \, p_1^3 \, x_2^3 + \dfrac{1}{8} \, \left(T - T^2 - 2 \, T^3 \right) \, p_1^2 \, p_2 \, x_2^3 + \dfrac{1}{8} \, T^2 \, p_1 \, p_2^2 \, x_2^3 \right],$

$c_{3,1} + T \, p_2 \, x_1 \, c_{3,4} + p_1 \, x_1 \, (c_{3,2} + c_{3,4} - T \, c_{3,4}) + T \, p_2 \, x_2 \, c_{3,5} + p_1 \, x_2 \, (c_{3,3} + c_{3,5} - T \, c_{3,5}) + T^2 \, p_2^2 \, x_1^2 \, c_{3,12} +$

$p_1 \, p_2 \, x_1^2 \, \left(T \, c_{3,9} + 2 \, T \, c_{3,12} - 2 \, T^2 \, c_{3,12} \right) + p_1^2 \, x_1^2 \, \left(c_{3,6} + c_{3,9} - T \, c_{3,9} + c_{3,12} - 2 \, T \, c_{3,12} + T^2 \, c_{3,12} \right) +$

$T^2 \, p_2^2 \, x_1 \, x_2 \, c_{3,13} + p_1 \, p_2 \, x_1 \, x_2 \, \left(T \, c_{3,10} + 2 \, T \, c_{3,13} - 2 \, T^2 \, c_{3,13} \right) +$

$p_1^2 \, x_1 \, x_2 \, \left(c_{3,7} + c_{3,10} - T \, c_{3,10} + c_{3,13} - 2 \, T \, c_{3,13} + T^2 \, c_{3,13} \right) + T^2 \, p_2^2 \, x_2^2 \, c_{3,14} +$

$p_1 \, p_2 \, x_2^2 \, \left(T \, c_{3,11} + 2 \, T \, c_{3,14} - 2 \, T^2 \, c_{3,14} \right) + p_1^2 \, x_2^2 \, \left(c_{3,8} + c_{3,11} - T \, c_{3,11} + c_{3,14} - 2 \, T \, c_{3,14} + T^2 \, c_{3,14} \right) +$

$T^3 \, p_2^3 \, x_1^3 \, c_{3,27} + p_1 \, p_2^2 \, x_1^3 \, \left(T^2 \, c_{3,23} + 3 \, T^2 \, c_{3,27} - 3 \, T^3 \, c_{3,27} \right) +$

$p_1^3 \, x_1^3 \, \left(c_{3,15} + c_{3,19} - T \, c_{3,19} + c_{3,23} - 2 \, T \, c_{3,23} + T^2 \, c_{3,23} + c_{3,27} - 3 \, T \, c_{3,27} + 3 \, T^2 \, c_{3,27} - T^3 \, c_{3,27} \right) +$

$p_1^2 \, p_2 \, x_1^3 \, \left(T \, c_{3,19} + 2 \, T \, c_{3,23} - 2 \, T^2 \, c_{3,23} + 3 \, T \, c_{3,27} - 6 \, T^2 \, c_{3,27} + 3 \, T^3 \, c_{3,27} \right) +$

$$T^3 \, p_2^3 \, x_1^2 \, x_2 \, c_{3,28} + p_1 \, p_2^2 \, x_1^2 \, x_2 \left(T^2 \, c_{3,24} + 3 \, T^2 \, c_{3,28} - 3 \, T^3 \, c_{3,28}\right) +$$

$$p_1^3 \, x_1^2 \, x_2 \left(c_{3,16} + c_{3,20} - T \, c_{3,20} + c_{3,24} - 2 \, T \, c_{3,24} + T^2 \, c_{3,24} + c_{3,28} - 3 \, T \, c_{3,28} + 3 \, T^2 \, c_{3,28} - T^3 \, c_{3,28}\right) +$$

$$p_1^2 \, p_2 \, x_1^2 \, x_2 \left(T \, c_{3,20} + 2 \, T \, c_{3,24} - 2 \, T^2 \, c_{3,24} + 3 \, T \, c_{3,28} - 6 \, T^2 \, c_{3,28} + 3 \, T^3 \, c_{3,28}\right) +$$

$$T^3 \, p_2^3 \, x_1 \, x_2^2 \, c_{3,29} + p_1 \, p_2^2 \, x_1 \, x_2^2 \left(T^2 \, c_{3,25} + 3 \, T^2 \, c_{3,29} - 3 \, T^3 \, c_{3,29}\right) +$$

$$p_1^3 \, x_1 \, x_2^2 \left(c_{3,17} + c_{3,21} - T \, c_{3,21} + c_{3,25} - 2 \, T \, c_{3,25} + T^2 \, c_{3,25} + c_{3,29} - 3 \, T \, c_{3,29} + 3 \, T^2 \, c_{3,29} - T^3 \, c_{3,29}\right) +$$

$$p_1^2 \, p_2 \, x_1 \, x_2^2 \left(T \, c_{3,21} + 2 \, T \, c_{3,25} - 2 \, T^2 \, c_{3,25} + 3 \, T \, c_{3,29} - 6 \, T^2 \, c_{3,29} + 3 \, T^3 \, c_{3,29}\right) +$$

$$T^3 \, p_2^3 \, x_2^3 \, c_{3,30} + p_1 \, p_2^2 \, x_2^3 \left(T^2 \, c_{3,26} + 3 \, T^2 \, c_{3,30} - 3 \, T^3 \, c_{3,30}\right) +$$

$$p_1^3 \, x_2^3 \left(c_{3,18} + c_{3,22} - T \, c_{3,22} + c_{3,26} - 2 \, T \, c_{3,26} + T^2 \, c_{3,26} + c_{3,30} - 3 \, T \, c_{3,30} + 3 \, T^2 \, c_{3,30} - T^3 \, c_{3,30}\right) +$$

$$p_1^2 \, p_2 \, x_2^3 \left(T \, c_{3,22} + 2 \, T \, c_{3,26} - 2 \, T^2 \, c_{3,26} + 3 \, T \, c_{3,30} - 6 \, T^2 \, c_{3,30} + 3 \, T^3 \, c_{3,30}\right) + T^4 \, p_2^4 \, x_1^4 \, c_{3,51} +$$

$$p_1 \, p_2^3 \, x_1^4 \left(T^3 \, c_{3,46} + 4 \, T^3 \, c_{3,51} - 4 \, T^4 \, c_{3,51}\right) + p_1^3 \, p_2 \, x_1^4 \left(T \, c_{3,36} + 2 \, T \, c_{3,41} - 2 \, T^2 \, c_{3,41} + \right.$$
$$\left. 3 \, T \, c_{3,46} - 6 \, T^2 \, c_{3,46} + 3 \, T^3 \, c_{3,46} + 4 \, T \, c_{3,51} - 12 \, T^2 \, c_{3,51} + 12 \, T^3 \, c_{3,51} - 4 \, T^4 \, c_{3,51}\right) +$$

$$p_1^4 \, x_1^4 \left(c_{3,31} + c_{3,36} - T \, c_{3,36} + c_{3,41} - 2 \, T \, c_{3,41} + T^2 \, c_{3,41} + c_{3,46} - 3 \, T \, c_{3,46} + 3 \, T^2 \, c_{3,46} - \right.$$
$$\left. T^3 \, c_{3,46} + c_{3,51} - 4 \, T \, c_{3,51} + 6 \, T^2 \, c_{3,51} - 4 \, T^3 \, c_{3,51} + T^4 \, c_{3,51}\right) +$$

$$p_1^2 \, p_2^2 \, x_1^4 \left(T^2 \, c_{3,41} + 3 \, T^2 \, c_{3,46} - 3 \, T^3 \, c_{3,46} + 6 \, T^2 \, c_{3,51} - 12 \, T^3 \, c_{3,51} + 6 \, T^4 \, c_{3,51}\right) + T^4 \, p_2^4 \, x_1^3 \, x_2 \, c_{3,52} +$$

$$p_1 \, p_2^3 \, x_1^3 \, x_2 \left(T^3 \, c_{3,47} + 4 \, T^3 \, c_{3,52} - 4 \, T^4 \, c_{3,52}\right) + p_1^3 \, p_2 \, x_1^3 \, x_2 \left(T \, c_{3,37} + 2 \, T \, c_{3,42} - 2 \, T^2 \, c_{3,42} + \right.$$
$$\left. 3 \, T \, c_{3,47} - 6 \, T^2 \, c_{3,47} + 3 \, T^3 \, c_{3,47} + 4 \, T \, c_{3,52} - 12 \, T^2 \, c_{3,52} + 12 \, T^3 \, c_{3,52} - 4 \, T^4 \, c_{3,52}\right) +$$

$$p_1^4 \, x_1^3 \, x_2 \left(c_{3,32} + c_{3,37} - T \, c_{3,37} + c_{3,42} - 2 \, T \, c_{3,42} + T^2 \, c_{3,42} + c_{3,47} - 3 \, T \, c_{3,47} + \right.$$
$$\left. 3 \, T^2 \, c_{3,47} - T^3 \, c_{3,47} + c_{3,52} - 4 \, T \, c_{3,52} + 6 \, T^2 \, c_{3,52} - 4 \, T^3 \, c_{3,52} + T^4 \, c_{3,52}\right) +$$

$$p_1^2 \, p_2^2 \, x_1^3 \, x_2 \left(T^2 \, c_{3,42} + 3 \, T^2 \, c_{3,47} - 3 \, T^3 \, c_{3,47} + 6 \, T^2 \, c_{3,52} - 12 \, T^3 \, c_{3,52} + 6 \, T^4 \, c_{3,52}\right) +$$

$$T^4 \, p_2^4 \, x_1^2 \, x_2^2 \, c_{3,53} + p_1 \, p_2^3 \, x_1^2 \, x_2^2 \left(T^3 \, c_{3,48} + 4 \, T^3 \, c_{3,53} - 4 \, T^4 \, c_{3,53}\right) +$$

$$p_1^3 \, p_2 \, x_1^2 \, x_2^2 \left(T \, c_{3,38} + 2 \, T \, c_{3,43} - 2 \, T^2 \, c_{3,43} + 3 \, T \, c_{3,48} - 6 \, T^2 \, c_{3,48} + 3 \, T^3 \, c_{3,48} + 4 \, T \, c_{3,53} - 12 \, T^2 \, c_{3,53} + \right.$$
$$\left. 12 \, T^3 \, c_{3,53} - 4 \, T^4 \, c_{3,53}\right) + p_1^4 \, x_1^2 \, x_2^2 \left(c_{3,33} + c_{3,38} - T \, c_{3,38} + c_{3,43} - 2 \, T \, c_{3,43} + T^2 \, c_{3,43} + \right.$$
$$\left. c_{3,48} - 3 \, T \, c_{3,48} + 3 \, T^2 \, c_{3,48} - T^3 \, c_{3,48} + c_{3,53} - 4 \, T \, c_{3,53} + 6 \, T^2 \, c_{3,53} - 4 \, T^3 \, c_{3,53} + T^4 \, c_{3,53}\right) +$$

$$p_1^2 \, p_2^2 \, x_1^2 \, x_2^2 \left(T^2 \, c_{3,43} + 3 \, T^2 \, c_{3,48} - 3 \, T^3 \, c_{3,48} + 6 \, T^2 \, c_{3,53} - 12 \, T^3 \, c_{3,53} + 6 \, T^4 \, c_{3,53}\right) +$$

$$T^4 \, p_2^4 \, x_1 \, x_2^3 \, c_{3,54} + p_1 \, p_2^3 \, x_1 \, x_2^3 \left(T^3 \, c_{3,49} + 4 \, T^3 \, c_{3,54} - 4 \, T^4 \, c_{3,54}\right) +$$

$$p_1^3 \, p_2 \, x_1 \, x_2^3 \left(T \, c_{3,39} + 2 \, T \, c_{3,44} - 2 \, T^2 \, c_{3,44} + 3 \, T \, c_{3,49} - 6 \, T^2 \, c_{3,49} + 3 \, T^3 \, c_{3,49} + 4 \, T \, c_{3,54} - 12 \, T^2 \, c_{3,54} + \right.$$
$$\left. 12 \, T^3 \, c_{3,54} - 4 \, T^4 \, c_{3,54}\right) + p_1^4 \, x_1 \, x_2^3 \left(c_{3,34} + c_{3,39} - T \, c_{3,39} + c_{3,44} - 2 \, T \, c_{3,44} + T^2 \, c_{3,44} + \right.$$
$$\left. c_{3,49} - 3 \, T \, c_{3,49} + 3 \, T^2 \, c_{3,49} - T^3 \, c_{3,49} + c_{3,54} - 4 \, T \, c_{3,54} + 6 \, T^2 \, c_{3,54} - 4 \, T^3 \, c_{3,54} + T^4 \, c_{3,54}\right) +$$

$$p_1^2 \, p_2^2 \, x_1 \, x_2^3 \left(T^2 \, c_{3,44} + 3 \, T^2 \, c_{3,49} - 3 \, T^3 \, c_{3,49} + 6 \, T^2 \, c_{3,54} - 12 \, T^3 \, c_{3,54} + 6 \, T^4 \, c_{3,54}\right) +$$

$$T^4 \, p_2^4 \, x_2^4 \, c_{3,55} + p_1 \, p_2^3 \, x_2^4 \left(T^3 \, c_{3,50} + 4 \, T^3 \, c_{3,55} - 4 \, T^4 \, c_{3,55}\right) + p_1^3 \, p_2 \, x_2^4 \left(T \, c_{3,40} + 2 \, T \, c_{3,45} - 2 \, T^2 \, c_{3,45} + \right.$$
$$\left. 3 \, T \, c_{3,50} - 6 \, T^2 \, c_{3,50} + 3 \, T^3 \, c_{3,50} + 4 \, T \, c_{3,55} - 12 \, T^2 \, c_{3,55} + 12 \, T^3 \, c_{3,55} - 4 \, T^4 \, c_{3,55}\right) +$$

$$p_1^4 \, x_2^4 \left(c_{3,35} + c_{3,40} - T \, c_{3,40} + c_{3,45} - 2 \, T \, c_{3,45} + T^2 \, c_{3,45} + c_{3,50} - 3 \, T \, c_{3,50} + 3 \, T^2 \, c_{3,50} - \right.$$
$$\left. T^3 \, c_{3,50} + c_{3,55} - 4 \, T \, c_{3,55} + 6 \, T^2 \, c_{3,55} - 4 \, T^3 \, c_{3,55} + T^4 \, c_{3,55}\right) +$$

$$\left.\left. p_1^2 \, p_2^2 \, x_2^4 \left(T^2 \, c_{3,45} + 3 \, T^2 \, c_{3,50} - 3 \, T^3 \, c_{3,50} + 6 \, T^2 \, c_{3,55} - 12 \, T^3 \, c_{3,55} + 6 \, T^4 \, c_{3,55}\right)\right]\right],$$

$$\mathbb{E}_{\{\}\to\{1\}}\left[\sqrt{T}, \, 0, \, \in \text{Series}\left[0, \, \frac{p_1 \, x_1}{2}, \, -\frac{1}{8} \, p_1 \, x_1, \, e_{3,1} + p_1 \, x_1 \, e_{3,2} + p_1^2 \, x_1^2 \, e_{3,3} + p_1^3 \, x_1^3 \, e_{3,4} + p_1^4 \, x_1^4 \, e_{3,5}\right]\right]\right\}$$

In[●]:= **unknowns = Cases$\left[\left\{R_{1,2}, \overline{R}_{1,2}, C_1, \overline{C}_1\right\}, (c \mid d \mid e \mid f)_{\$k,\_}, \infty\right]$ // Union**

$\textit{Out[•]=}$ $\{c_{3,1}, c_{3,2}, c_{3,3}, c_{3,4}, c_{3,5}, c_{3,6}, c_{3,7}, c_{3,8}, c_{3,9}, c_{3,10}, c_{3,11}, c_{3,12}, c_{3,13}, c_{3,14}, c_{3,15}, c_{3,16},$
$c_{3,17}, c_{3,18}, c_{3,19}, c_{3,20}, c_{3,21}, c_{3,22}, c_{3,23}, c_{3,24}, c_{3,25}, c_{3,26}, c_{3,27}, c_{3,28}, c_{3,29}, c_{3,30}, c_{3,31},$
$c_{3,32}, c_{3,33}, c_{3,34}, c_{3,35}, c_{3,36}, c_{3,37}, c_{3,38}, c_{3,39}, c_{3,40}, c_{3,41}, c_{3,42}, c_{3,43}, c_{3,44}, c_{3,45},$
$c_{3,46}, c_{3,47}, c_{3,48}, c_{3,49}, c_{3,50}, c_{3,51}, c_{3,52}, c_{3,53}, c_{3,54}, c_{3,55}, d_{3,1}, d_{3,2}, d_{3,3}, d_{3,4}, d_{3,5},$
$d_{3,6}, d_{3,7}, d_{3,8}, d_{3,9}, d_{3,10}, d_{3,11}, d_{3,12}, d_{3,13}, d_{3,14}, d_{3,15}, d_{3,16}, d_{3,17}, d_{3,18}, d_{3,19}, d_{3,20},$
$d_{3,21}, d_{3,22}, d_{3,23}, d_{3,24}, d_{3,25}, d_{3,26}, d_{3,27}, d_{3,28}, d_{3,29}, d_{3,30}, d_{3,31}, d_{3,32}, d_{3,33}, d_{3,34}, d_{3,35},$
$d_{3,36}, d_{3,37}, d_{3,38}, d_{3,39}, d_{3,40}, d_{3,41}, d_{3,42}, d_{3,43}, d_{3,44}, d_{3,45}, d_{3,46}, d_{3,47}, d_{3,48}, d_{3,49},$
$d_{3,50}, d_{3,51}, d_{3,52}, d_{3,53}, d_{3,54}, d_{3,55}, e_{3,1}, e_{3,2}, e_{3,3}, e_{3,4}, e_{3,5}, f_{3,1}, f_{3,2}, f_{3,3}, f_{3,4}, f_{3,5}\}$

$\textit{In[•]:=}$ **Short[errors = CCF /@ Cases[RMoves, $a\_$ == $b\_$:> a - b], 25]**

$\textit{Out[•]//Short=}$

$\Big\{ \dfrac{1}{192} \big(12\,T\,p_1\,p_2\,x_2\,x_3 - 12\,T^3\,p_1\,p_2\,x_2\,x_3 + 80\,T\,p_1^3\,x_1\,x_2\,x_3 - 160\,T^2\,p_1^3\,x_1\,x_2\,x_3 + 80\,T^3\,p_1^3\,x_1\,x_2\,x_3 +$

$12\,T\,p_1^2\,p_2\,x_1\,x_2\,x_3 + 72\,T^2\,p_1^2\,p_2\,x_1\,x_2\,x_3 - 84\,T^3\,p_1^2\,p_2\,x_1\,x_2\,x_3 - 24\,T^2\,p_1\,p_2^2\,x_1\,x_2\,x_3 +$

$24\,T^3\,p_1\,p_2^2\,x_1\,x_2\,x_3 + 24\,T^2\,p_1^2\,p_3\,x_1\,x_2\,x_3 - 24\,T^3\,p_1^2\,p_3\,x_1\,x_2\,x_3 + 37\,p_1^4\,x_1^2\,x_2\,x_3 - 149\,T\,p_1^4\,x_1^2\,x_2\,x_3 +$

$187\,T^2\,p_1^4\,x_1^2\,x_2\,x_3 - 75\,T^3\,p_1^4\,x_1^2\,x_2\,x_3 + 76\,T\,p_1^3\,p_2\,x_1^2\,x_2\,x_3 - 220\,T^2\,p_1^3\,p_2\,x_1^2\,x_2\,x_3 + 144\,T^3\,p_1^3\,p_2\,x_1^2\,x_2\,x_3 +$

$48\,T^2\,p_1^2\,p_2^2\,x_1^2\,x_2\,x_3 - 48\,T^3\,p_1^2\,p_2^2\,x_1^2\,x_2\,x_3 - 12\,T^2\,p_1^3\,p_3\,x_1^2\,x_2\,x_3 + 12\,T^3\,p_1^3\,p_3\,x_1^2\,x_2\,x_3 +$

$4\,T^2\,p_1^3\,x_2^2\,x_3 - 8\,T^3\,p_1^3\,x_2^2\,x_3 + 4\,T^4\,p_1^3\,x_2^2\,x_3 - 54\,T\,p_1^2\,p_2\,x_2^2\,x_3 - 12\,T^2\,p_1^2\,p_2\,x_2^2\,x_3 + 138\,T^3\,p_1^2\,p_2\,x_2^2\,x_3 -$

$72\,T^4\,p_1^2\,p_2\,x_2^2\,x_3 - 66\,T^2\,p_1\,p_2^2\,x_2^2\,x_3 + 36\,T^3\,p_1\,p_2^2\,x_2^2\,x_3 + 30\,T^4\,p_1\,p_2^2\,x_2^2\,x_3 - 24\,T^3\,p_1\,p_2\,p_3\,x_2^2\,x_3 +$

$24\,T^4\,p_1\,p_2\,p_3\,x_2^2\,x_3 - 77\,T\,p_1^4\,x_1\,x_2^2\,x_3 + \ll 8170 \gg + 16\,128\,T^3\,p_1^3\,p_2\,x_3^4\,c_{3,55} - 26\,880\,T^4\,p_1^3\,p_2\,x_3^4\,c_{3,55} +$

$26\,880\,T^5\,p_1^3\,p_2\,x_3^4\,c_{3,55} - 16\,128\,T^6\,p_1^3\,p_2\,x_3^4\,c_{3,55} + 5376\,T^7\,p_1^3\,p_2\,x_3^4\,c_{3,55} - 768\,T^8\,p_1^3\,p_2\,x_3^4\,c_{3,55} +$

$1152\,T^2\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} - 6912\,T^3\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} + 17\,280\,T^4\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} - 23\,040\,T^5\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} +$

$17\,280\,T^6\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} - 6912\,T^7\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} + 1152\,T^8\,p_1^2\,p_2^2\,x_3^4\,c_{3,55} + 768\,T^3\,p_1\,p_2^3\,x_3^4\,c_{3,55} -$

$3840\,T^4\,p_1\,p_2^3\,x_3^4\,c_{3,55} + 7680\,T^5\,p_1\,p_2^3\,x_3^4\,c_{3,55} - 7680\,T^6\,p_1\,p_2^3\,x_3^4\,c_{3,55} + 3840\,T^7\,p_1\,p_2^3\,x_3^4\,c_{3,55} -$

$768\,T^8\,p_1\,p_2^3\,x_3^4\,c_{3,55} + 768\,T^5\,p_1^3\,p_3\,x_3^4\,c_{3,55} - 2304\,T^6\,p_1^3\,p_3\,x_3^4\,c_{3,55} + 2304\,T^7\,p_1^3\,p_3\,x_3^4\,c_{3,55} -$

$768\,T^8\,p_1^3\,p_3\,x_3^4\,c_{3,55} - 768\,T^5\,p_2^3\,p_3\,x_3^4\,c_{3,55} + 2304\,T^6\,p_2^3\,p_3\,x_3^4\,c_{3,55} - 2304\,T^7\,p_2^3\,p_3\,x_3^4\,c_{3,55} +$

$768\,T^8\,p_2^3\,p_3\,x_3^4\,c_{3,55} + 1152\,T^6\,p_1^2\,p_3^2\,x_3^4\,c_{3,55} - 2304\,T^7\,p_1^2\,p_3^2\,x_3^4\,c_{3,55} + 1152\,T^8\,p_1^2\,p_3^2\,x_3^4\,c_{3,55} -$

$1152\,T^6\,p_2^2\,p_3^2\,x_3^4\,c_{3,55} + 2304\,T^7\,p_2^2\,p_3^2\,x_3^4\,c_{3,55} - 1152\,T^8\,p_2^2\,p_3^2\,x_3^4\,c_{3,55} + 768\,T^7\,p_1\,p_3^3\,x_3^4\,c_{3,55} -$

$768\,T^8\,p_1\,p_3^3\,x_3^4\,c_{3,55} - 768\,T^7\,p_2\,p_3^3\,x_3^4\,c_{3,55} + 768\,T^8\,p_2\,p_3^3\,x_3^4\,c_{3,55} \big),\ \ll 7 \gg,\ \dfrac{-12\,T + \ll 402 \gg + \ll 1 \gg}{96\,T^4} \Big\}$

$\textit{In[•]:=}$ **Short[#, 10] &[eqns =**
   Thread[0 == Union @@ (CoefficientRules[#, {x_1, x_2, x_3, p_1, p_2, p_3}]〚 ;; , 2〛 & /@ errors)]]

$\textit{Out[•]//Short=}$

$\Big\{ 0 == T\,c_{3,4} - T^2\,c_{3,4},\ 0 == -T\,c_{3,4} + T^2\,c_{3\,\ll 1 \gg\,\ll 1 \gg},\ \ll 490 \gg,\ 0 == \ll 1 \gg,$

$0 == \dfrac{3}{8} + \dfrac{23\,T}{16} - T^2 - \dfrac{15\,T^3}{16} + d_{3,6} + T\,d_{3,7} + T^2\,d_{3,8} + d_{3,9} + T\,d_{3,10} + T^2\,d_{3,11} + d_{3,12} + T\,d_{3,13} + T^2\,d_{3,14} -$

$3\,T\,d_{3,16} - 6\,T^2\,d_{3,17} - 9\,T^3\,d_{3,18} + d_{3,20} - 3\,T\,d_{3,20} + 2\,T\,d_{3,21} - 6\,T^2\,d_{3,21} + 3\,T^2\,d_{3,22} - 9\,T^3\,d_{3,22} + 2\,d_{3,24} -$

$3\,T\,d_{3,24} + 4\,T\,d_{3,25} - 6\,T^2\,d_{3,25} + 6\,T^2\,d_{3,26} - 9\,T^3\,d_{3,26} + 3\,d_{3,28} - 3\,T\,d_{3,28} + 6\,T\,d_{3,29} - 6\,T^2\,d_{3,29} +$

$\ll 18 \gg + 12\,T^2\,d_{3,43} + 6\,T\,d_{3,44} - 36\,T^2\,d_{3,44} + 36\,T^3\,d_{3,44} + 12\,T^2\,d_{3,45} - 72\,T^3\,d_{3,45} + 72\,T^4\,d_{3,45} +$

$6\,d_{3,48} - 18\,T\,d_{3,48} + 12\,T^2\,d_{3,48} + 18\,T\,d_{3,49} - 54\,T^2\,d_{3,49} + 36\,T^3\,d_{3,49} + 36\,T^2\,d_{3,50} - 108\,T^3\,d_{3,50} +$

$72\,T^4\,d_{3,50} + 12\,d_{3,53} - 24\,T\,d_{3,53} + 12\,T^2\,d_{3,53} + 36\,T\,d_{3,54} - 72\,T^2\,d_{3,54} + 36\,T^3\,d_{3,54} + 72\,T^2\,d_{3,55} -$

$144\,T^3\,d_{3,55} + 72\,T^4\,d_{3,55} + T^2\,f_{3,3} + 9\,T^2\,f_{3,4} - 9\,T^3\,f_{3,4} + 72\,T^2\,f_{3,5} - 144\,T^3\,f_{3,5} + 72\,T^4\,f_{3,5} \Big\}$

$\textit{In[•]:=}$ **{sol} = Solve[eqns, unknowns]**

Solve: Equations may not give solutions for all "solve" variables.

$\text{Out[}_{\circ}\text{]=}$ $\left\{\left\{c_{3,1} \to -\dfrac{c_{3,2}}{2} - \dfrac{c_{3,5}}{2}, \; c_{3,3} \to -T\, c_{3,2} - c_{3,5}, \; c_{3,4} \to 0, \; c_{3,6} \to 0, \right.\right.$

$c_{3,7} \to \dfrac{1}{32}(-1-T) - \dfrac{1}{2}(1+T)\,c_{3,10} - c_{3,11}, \; c_{3,8} \to -\dfrac{1}{2}\left(T-T^2\right)c_{3,10} - (1-T)\,c_{3,11},$

$c_{3,9} \to 0, \; c_{3,12} \to 0, \; c_{3,13} \to 0, \; c_{3,14} \to 0, \; c_{3,15} \to 0, \; c_{3,16} \to \dfrac{1}{96}(5+7\,T) - c_{3,26},$

$c_{3,17} \to \dfrac{1}{48}\left(7-3\,T-4\,T^2\right) - (1-T)\,c_{3,26}, \; c_{3,18} \to \dfrac{1}{48}\left(-7\,T+8\,T^2-T^3\right), \; c_{3,19} \to 0,$

$c_{3,20} \to \dfrac{1}{16}, \; c_{3,21} \to \dfrac{1}{32}(-3-7\,T), \; c_{3,22} \to \dfrac{1}{16}\left(2\,T+T^2\right) - (1-T)\,c_{3,26}, \; c_{3,23} \to 0,$

$c_{3,24} \to 0, \; c_{3,25} \to \dfrac{1}{16}, \; c_{3,27} \to 0, \; c_{3,28} \to 0, \; c_{3,29} \to 0, \; c_{3,30} \to 0, \; c_{3,31} \to 0,$

$c_{3,32} \to \dfrac{1}{192}(-3-5\,T) - c_{3,50}, \; c_{3,33} \to \dfrac{1}{64}\left(-3-5\,T+8\,T^2\right) + \dfrac{3}{2}(-1+T)\,c_{3,50},$

$c_{3,34} \to \dfrac{1}{192}\left(13-23\,T+43\,T^2-33\,T^3\right) - \left(1-2\,T+T^2\right)c_{3,50},$

$c_{3,35} \to \dfrac{1}{192}\left(-17\,T+36\,T^2-39\,T^3+20\,T^4\right) - \dfrac{1}{2}\left(1-3\,T+3\,T^2-T^3\right)c_{3,50},$

$c_{3,36} \to 0, \; c_{3,37} \to -\dfrac{1}{48}, \; c_{3,38} \to \dfrac{1}{48}(1+9\,T), \; c_{3,39} \to \dfrac{1}{48}\left(-13+13\,T-12\,T^2\right),$

$c_{3,40} \to \dfrac{1}{16}\left(5\,T-6\,T^2+3\,T^3\right) - \left(-1+2\,T-T^2\right)c_{3,50}, \; c_{3,41} \to 0, \; c_{3,42} \to 0, \; c_{3,43} \to -\dfrac{1}{8},$

$c_{3,44} \to \dfrac{1}{32}(6+5\,T), \; c_{3,45} \to -\dfrac{7\,T}{32} + \dfrac{3}{2}(-1+T)\,c_{3,50}, \; c_{3,46} \to 0, \; c_{3,47} \to 0, \; c_{3,48} \to 0, \; c_{3,49} \to -\dfrac{1}{48},$

$c_{3,51} \to 0, \; c_{3,52} \to 0, \; c_{3,53} \to 0, \; c_{3,54} \to 0, \; c_{3,55} \to 0, \; d_{3,1} \to \dfrac{c_{3,2}}{2} + \dfrac{c_{3,5}}{2}, \; d_{3,2} \to -c_{3,2},$

$d_{3,3} \to \dfrac{c_{3,2}}{T} + c_{3,5}, \; d_{3,4} \to 0, \; d_{3,5} \to -c_{3,5}, \; d_{3,6} \to 0, \; d_{3,7} \to -\dfrac{1-3\,T}{32\,T} - \dfrac{(1-3\,T)\,c_{3,10}}{2\,T} + \dfrac{c_{3,11}}{T},$

$d_{3,8} \to -\dfrac{-1+2\,T-T^2}{16\,T^2} - \dfrac{\left(-1+3\,T-2\,T^2\right)c_{3,10}}{2\,T^2} - \dfrac{(1-T)\,c_{3,11}}{T^2}, \; d_{3,9} \to 0, \; d_{3,10} \to -c_{3,10},$

$d_{3,11} \to -\dfrac{-1+T}{16\,T} - \dfrac{(-1+T)\,c_{3,10}}{T} - \dfrac{c_{3,11}}{T}, \; d_{3,12} \to 0, \; d_{3,13} \to 0, \; d_{3,14} \to 0,$

$d_{3,15} \to 0, \; d_{3,16} \to -\dfrac{-5+17\,T}{96\,T} + \dfrac{c_{3,26}}{T}, \; d_{3,17} \to -\dfrac{2-15\,T+13\,T^2}{48\,T^2} - \dfrac{(1-T)\,c_{3,26}}{T^2},$

$d_{3,18} \to -\dfrac{-1+8\,T-7\,T^2}{48\,T^3}, \; d_{3,19} \to 0, \; d_{3,20} \to -\dfrac{1}{16}, \; d_{3,21} \to -\dfrac{-7-3\,T}{32\,T},$

$d_{3,22} \to -\dfrac{3-2\,T+2\,T^2}{16\,T^2} - \dfrac{(1-T)\,c_{3,26}}{T^2}, \; d_{3,23} \to 0, \; d_{3,24} \to 0, \; d_{3,25} \to -\dfrac{1}{16}, \; d_{3,26} \to -\dfrac{1-T}{8\,T} - \dfrac{c_{3,26}}{T},$

$d_{3,27} \to 0, \; d_{3,28} \to 0, \; d_{3,29} \to 0, \; d_{3,30} \to 0, \; d_{3,31} \to 0, \; d_{3,32} \to -\dfrac{3-11\,T}{192\,T} + \dfrac{c_{3,50}}{T},$

$$d_{3,33} \to -\frac{4 + 3\,T - 7\,T^2}{64\,T^2} + \frac{3\,(-1 + T)\,c_{3,50}}{2\,T^2},\ d_{3,34} \to -\frac{-25 + 19\,T + T^2 + 5\,T^3}{192\,T^3} - \frac{\left(-1 + 2\,T - T^2\right)\,c_{3,50}}{T^3},$$

$$d_{3,35} \to -\frac{16 - 23\,T + 12\,T^2 - T^3 - 4\,T^4}{192\,T^4} - \frac{\left(1 - 3\,T + 3\,T^2 - T^3\right)\,c_{3,50}}{2\,T^4},\ d_{3,36} \to 0,\ d_{3,37} \to \frac{1}{48},$$

$$d_{3,38} \to -\frac{9 + T}{48\,T},\ d_{3,39} \to -\frac{-12 + 13\,T - 13\,T^2}{48\,T^2},\ d_{3,40} \to -\frac{7 - 12\,T + 9\,T^2 + 2\,T^3}{48\,T^3} - \frac{\left(1 - 2\,T + T^2\right)\,c_{3,50}}{T^3},$$

$$d_{3,41} \to 0,\ d_{3,42} \to 0,\ d_{3,43} \to \frac{1}{8},\ d_{3,44} \to -\frac{5 + 6\,T}{32\,T},\ d_{3,45} \to -\frac{-2 - 3\,T - 2\,T^2}{32\,T^2} + \frac{3\,(-1 + T)\,c_{3,50}}{2\,T^2},$$

$$d_{3,46} \to 0,\ d_{3,47} \to 0,\ d_{3,48} \to 0,\ d_{3,49} \to \frac{1}{48},\ d_{3,50} \to -\frac{-1 + T}{24\,T} - \frac{c_{3,50}}{T},\ d_{3,51} \to 0,$$

$$d_{3,52} \to 0,\ d_{3,53} \to 0,\ d_{3,54} \to 0,\ d_{3,55} \to 0,\ e_{3,1} \to -\frac{c_{3,2}}{2} - \frac{c_{3,5}}{2},\ e_{3,2} \to -c_{3,10},\ e_{3,3} \to 0,$$

$$e_{3,4} \to 0,\ e_{3,5} \to 0,\ f_{3,1} \to \frac{c_{3,2}}{2} + \frac{c_{3,5}}{2},\ f_{3,2} \to c_{3,10},\ f_{3,3} \to 0,\ f_{3,4} \to 0,\ f_{3,5} \to 0\Big\}\Big\}$$

In[ ]:= **sol /. (** *a_* **→** *b_* **) :→ (** *a* **=** *b* **)**

$Out[\bullet]= \Big\{ -\dfrac{c_{3,2}}{2} - \dfrac{c_{3,5}}{2},\ -T\,c_{3,2} - c_{3,5},\ 0,\ 0,\ \dfrac{1}{32}\,(-1-T) - \dfrac{1}{2}\,(1+T)\,c_{3,10} - c_{3,11},$

$-\dfrac{1}{2}\,\big(T - T^2\big)\,c_{3,10} - (1-T)\,c_{3,11},\ 0,\ 0,\ 0,\ 0,\ 0,\ \dfrac{1}{96}\,(5+7\,T) - c_{3,26},$

$\dfrac{1}{48}\,\big(7 - 3\,T - 4\,T^2\big) - (1-T)\,c_{3,26},\ \dfrac{1}{48}\,\big(-7\,T + 8\,T^2 - T^3\big),\ 0,\ \dfrac{1}{16},\ \dfrac{1}{32}\,(-3-7\,T),$

$\dfrac{1}{16}\,\big(2\,T + T^2\big) - (1-T)\,c_{3,26},\ 0,\ 0,\ \dfrac{1}{16},\ 0,\ 0,\ 0,\ 0,\ 0,\ \dfrac{1}{192}\,(-3-5\,T) - c_{3,50},$

$\dfrac{1}{64}\,\big(-3 - 5\,T + 8\,T^2\big) + \dfrac{3}{2}\,(-1+T)\,c_{3,50},\ \dfrac{1}{192}\,\big(13 - 23\,T + 43\,T^2 - 33\,T^3\big) - \big(1 - 2\,T + T^2\big)\,c_{3,50},$

$\dfrac{1}{192}\,\big(-17\,T + 36\,T^2 - 39\,T^3 + 20\,T^4\big) - \dfrac{1}{2}\,\big(1 - 3\,T + 3\,T^2 - T^3\big)\,c_{3,50},\ 0,\ -\dfrac{1}{48},\ \dfrac{1}{48}\,(1+9\,T),$

$\dfrac{1}{48}\,\big(-13 + 13\,T - 12\,T^2\big),\ \dfrac{1}{16}\,\big(5\,T - 6\,T^2 + 3\,T^3\big) - \big(-1 + 2\,T - T^2\big)\,c_{3,50},\ 0,\ 0,\ -\dfrac{1}{8},\ \dfrac{1}{32}\,(6+5\,T),$

$-\dfrac{7\,T}{32} + \dfrac{3}{2}\,(-1+T)\,c_{3,50},\ 0,\ 0,\ 0,\ -\dfrac{1}{48},\ 0,\ 0,\ 0,\ 0,\ 0,\ \dfrac{c_{3,2}}{2} + \dfrac{c_{3,5}}{2},\ -c_{3,2},\ \dfrac{c_{3,2}}{T} + c_{3,5},\ 0,\ -c_{3,5},\ 0,$

$-\dfrac{1 - 3\,T}{32\,T} - \dfrac{(1 - 3\,T)\,c_{3,10}}{2\,T} + \dfrac{c_{3,11}}{T},\ -\dfrac{-1 + 2\,T - T^2}{16\,T^2} - \dfrac{\big(-1 + 3\,T - 2\,T^2\big)\,c_{3,10}}{2\,T^2} - \dfrac{(1-T)\,c_{3,11}}{T^2},\ 0,\ -c_{3,10},$

$-\dfrac{-1 + T}{16\,T} - \dfrac{(-1+T)\,c_{3,10}}{T} - \dfrac{c_{3,11}}{T},\ 0,\ 0,\ 0,\ 0,\ -\dfrac{-5 + 17\,T}{96\,T} + \dfrac{c_{3,26}}{T},\ -\dfrac{2 - 15\,T + 13\,T^2}{48\,T^2} - \dfrac{(1-T)\,c_{3,26}}{T^2},$

$-\dfrac{-1 + 8\,T - 7\,T^2}{48\,T^3},\ 0,\ -\dfrac{1}{16},\ -\dfrac{-7 - 3\,T}{32\,T},\ -\dfrac{3 - 2\,T + 2\,T^2}{16\,T^2} - \dfrac{(1-T)\,c_{3,26}}{T^2},\ 0,\ 0,\ -\dfrac{1}{16},$

$-\dfrac{1 - T}{8\,T} - \dfrac{c_{3,26}}{T},\ 0,\ 0,\ 0,\ 0,\ 0,\ -\dfrac{3 - 11\,T}{192\,T} + \dfrac{c_{3,50}}{T},\ -\dfrac{4 + 3\,T - 7\,T^2}{64\,T^2} + \dfrac{3\,(-1+T)\,c_{3,50}}{2\,T^2},$

$-\dfrac{-25 + 19\,T + T^2 + 5\,T^3}{192\,T^3} - \dfrac{\big(-1 + 2\,T - T^2\big)\,c_{3,50}}{T^3},\ -\dfrac{16 - 23\,T + 12\,T^2 - T^3 - 4\,T^4}{192\,T^4} - \dfrac{\big(1 - 3\,T + 3\,T^2 - T^3\big)\,c_{3,50}}{2\,T^4},$

$0,\ \dfrac{1}{48},\ -\dfrac{9 + T}{48\,T},\ -\dfrac{-12 + 13\,T - 13\,T^2}{48\,T^2},\ -\dfrac{7 - 12\,T + 9\,T^2 + 2\,T^3}{48\,T^3} - \dfrac{\big(1 - 2\,T + T^2\big)\,c_{3,50}}{T^3},\ 0,$

$0,\ \dfrac{1}{8},\ -\dfrac{5 + 6\,T}{32\,T},\ -\dfrac{-2 - 3\,T - 2\,T^2}{32\,T^2} + \dfrac{3\,(-1+T)\,c_{3,50}}{2\,T^2},\ 0,\ 0,\ 0,\ \dfrac{1}{48},\ -\dfrac{-1 + T}{24\,T} - \dfrac{c_{3,50}}{T},$

$0,\ 0,\ 0,\ 0,\ 0,\ -\dfrac{c_{3,2}}{2} - \dfrac{c_{3,5}}{2},\ -c_{3,10},\ 0,\ 0,\ 0,\ \dfrac{c_{3,2}}{2} + \dfrac{c_{3,5}}{2},\ c_{3,10},\ 0,\ 0,\ 0 \Big\}$

$In[\bullet]:=$ **Cases** $\big[\{ R_{1,2},\ \overline{R}_{1,2},\ C_1,\ \overline{C}_1 \},\ (c \mid d \mid e \mid f)_{\$k,\_} ,\ \infty \big]$ **// Union**

$Out[\bullet]=$ $\{ c_{3,2},\ c_{3,5},\ c_{3,10},\ c_{3,11},\ c_{3,26},\ c_{3,50} \}$

$In[\bullet]:=$ **CF** $\Big[\big\{ C_1,\ \big(C_1[\![3,\ 4]\!] \ /.\ T \to T^{-1} \big) + \overline{C}_1[\![3,\ 4]\!],\ \big(Rp_{1,2} \ /.\ T \to T^{-1} \big)[\![3,\ 4]\!] + \overline{Rp}_{1,2}[\![3,\ 4]\!] \big\} \ /.$

$\{ c_{3,26} \to -1\,/\,8,\ c_{3,50} \to 1\,/\,24,\ c_{3,11} \to 1\,/\,16 + c_{3,10} \} \Big]$

$Out[\bullet]=$ $\Big\{ \mathbb{E}_{\{\} \to \{1\}} \Big[\sqrt{T},\ 0,\ \in\text{Series}\Big[0,\ \dfrac{p_1\,x_1}{2},\ -\dfrac{1}{8}\,p_1\,x_1,\ \dfrac{1}{2}\,(-c_{3,2} - c_{3,5}) - p_1\,x_1\,c_{3,10} \Big] \Big],\ 0,\ 0 \Big\}$

In[ ]:= $\mathsf{CF}\left[\mathsf{Rp}_{1,2} \; /. \; \{c_{3,26} \to -1\,/\,8, \; c_{3,50} \to 1\,/\,24, \; c_{3,11} \to 1\,/\,16 + c_{3,10}\}\right]$

Out[ ]= $\mathbb{E}_{\{\} \to \{1,2\}}\left[1, \; 0, \; \epsilon\mathsf{Series}\left[0, \; \frac{1}{4}\,(1 - T)\,p_1^2\,x_1\,x_2 - \frac{1}{2}\,p_1\,p_2\,x_1\,x_2 + \frac{1}{4}\,\left(-T + T^2\right)\,p_1^2\,x_2^2 + \frac{1}{2}\,T\,p_1\,p_2\,x_2^2,\right.\right.$

$\quad \frac{1}{16}\,(1 - T)\,p_1^2\,x_1\,x_2 + \frac{1}{8}\,p_1\,p_2\,x_1\,x_2 + \frac{1}{24}\,(-1 + T)\,p_1^3\,x_1^2\,x_2 - \frac{1}{8}\,p_1^2\,p_2\,x_1^2\,x_2 +$

$\quad \frac{1}{16}\,\left(2 - 3\,T + T^2\right)\,p_1^2\,x_2^2 - \frac{1}{8}\,p_1\,p_2\,x_2^2 + \frac{1}{12}\,\left(-2 + T + T^2\right)\,p_1^3\,x_1\,x_2^2 + \frac{1}{8}\,(1 + 2\,T)\,p_1^2\,p_2\,x_1\,x_2^2 -$

$\quad \frac{1}{8}\,p_1\,p_2^2\,x_1\,x_2^2 + \frac{1}{24}\,\left(T + 2\,T^2 - 3\,T^3\right)\,p_1^3\,x_2^3 + \frac{1}{8}\,\left(-1 + T - 2\,T^2\right)\,p_1^2\,p_2\,x_2^3 + \frac{1}{8}\,p_1\,p_2^2\,x_2^3,$

$\quad \frac{1}{96}\,(17 + 7\,T)\,p_1^3\,x_1^2\,x_2 + \frac{1}{16}\,p_1^2\,p_2\,x_1^2\,x_2 + \frac{1}{192}\,(-11 - 5\,T)\,p_1^4\,x_1^3\,x_2 - \frac{1}{48}\,p_1^3\,p_2\,x_1^3\,x_2 +$

$\quad \frac{1}{48}\,\left(13 - 9\,T - 4\,T^2\right)\,p_1^3\,x_1\,x_2^2 + \frac{1}{32}\,(-3 - 7\,T)\,p_1^2\,p_2\,x_1\,x_2^2 + \frac{1}{16}\,p_1\,p_2^2\,x_1\,x_2^2 + \frac{1}{64}\,\left(-7 - T + 8\,T^2\right)\,p_1^4\,x_1^2\,x_2^2 +$

$\quad \frac{1}{48}\,(1 + 9\,T)\,p_1^3\,p_2\,x_1^2\,x_2^2 - \frac{1}{8}\,p_1^2\,p_2^2\,x_1^2\,x_2^2 + \frac{1}{48}\,\left(-7\,T + 8\,T^2 - T^3\right)\,p_1^3\,x_2^3 + \frac{1}{16}\,\left(2 + T^2\right)\,p_1^2\,p_2\,x_2^3 -$

$\quad \frac{1}{8}\,p_1\,p_2^2\,x_2^3 + \frac{1}{192}\,\left(5 - 7\,T + 35\,T^2 - 33\,T^3\right)\,p_1^4\,x_1\,x_2^3 + \frac{1}{48}\,\left(-13 + 13\,T - 12\,T^2\right)\,p_1^3\,p_2\,x_1\,x_2^3 +$

$\quad \frac{1}{32}\,(6 + 5\,T)\,p_1^2\,p_2^2\,x_1\,x_2^3 - \frac{1}{48}\,p_1\,p_2^3\,x_1\,x_2^3 + \frac{1}{192}\,\left(-4 - 5\,T + 24\,T^2 - 35\,T^3 + 20\,T^4\right)\,p_1^4\,x_2^4 +$

$\quad \frac{1}{48}\,\left(2 + 11\,T - 16\,T^2 + 9\,T^3\right)\,p_1^3\,p_2\,x_2^4 + \frac{1}{32}\,(-2 - 5\,T)\,p_1^2\,p_2^2\,x_2^4 + \frac{1}{24}\,p_1\,p_2^3\,x_2^4 + p_1\,x_1\,c_{3,2} +$

$\quad \frac{1}{2}\,(-c_{3,2} - c_{3,5}) + p_1\,x_2\,(-T\,c_{3,2} - c_{3,5}) + p_2\,x_2\,c_{3,5} + p_1\,p_2\,x_1\,x_2\,c_{3,10} + \frac{1}{16}\,p_1\,p_2\,x_2^2\,(1 + 16\,c_{3,10}) +$

$\quad \left.\left.\frac{1}{32}\,p_1^2\,x_1\,x_2\,(-3 - T - 48\,c_{3,10} - 16\,T\,c_{3,10}) + \frac{1}{16}\,p_1^2\,x_2^2\,\left(-1 + T - 16\,c_{3,10} + 8\,T\,c_{3,10} + 8\,T^2\,c_{3,10}\right)\right]\right]$

$In[\bullet]:=$ **CF**$\Big[$

     Rp$_{1,2}$ /. {**c$_{3,26}$ → -1 / 8, c$_{3,50}$ → 1 / 24, c$_{3,11}$ → 1 / 16 + c$_{3,10}$**} /. {**c$_{3,2}$ → 0, c$_{3,5}$ → 0, c$_{3,10}$ → -1 / 32**}$\Big]$

$Out[\bullet]=$ $\mathbb{E}_{\{\}\to\{1,2\}}\Big[1,\ 0,\ \in$Series$\Big[0,\ \frac{1}{4}\ (1-T)\ p_1^2\ x_1\ x_2 - \frac{1}{2}\ p_1\ p_2\ x_1\ x_2 + \frac{1}{4}\ \left(-T+T^2\right)\ p_1^2\ x_2^2 + \frac{1}{2}\ T\ p_1\ p_2\ x_2^2,$

     $\frac{1}{16}\ (1-T)\ p_1^2\ x_1\ x_2 + \frac{1}{8}\ p_1\ p_2\ x_1\ x_2 + \frac{1}{24}\ (-1+T)\ p_1^3\ x_1^2\ x_2 - \frac{1}{8}\ p_1^2\ p_2\ x_1^2\ x_2 +$

     $\frac{1}{16}\ \left(2-3\ T+T^2\right)\ p_1^2\ x_2^2 - \frac{1}{8}\ p_1\ p_2\ x_2^2 + \frac{1}{12}\ \left(-2+T+T^2\right)\ p_1^3\ x_1\ x_2^2 + \frac{1}{8}\ (1+2\ T)\ p_1^2\ p_2\ x_1\ x_2^2 -$

     $\frac{1}{8}\ p_1\ p_2^2\ x_1\ x_2^2 + \frac{1}{24}\ \left(T+2\ T^2-3\ T^3\right)\ p_1^3\ x_2^3 + \frac{1}{8}\ \left(-1+T-2\ T^2\right)\ p_1^2\ p_2\ x_2^3 + \frac{1}{8}\ p_1\ p_2^2\ x_2^3,$

     $\frac{1}{64}\ (-3-T)\ p_1^2\ x_1\ x_2 - \frac{1}{32}\ p_1\ p_2\ x_1\ x_2 + \frac{1}{96}\ (17+7\ T)\ p_1^3\ x_1^2\ x_2 + \frac{1}{16}\ p_1^2\ p_2\ x_1^2\ x_2 +$

     $\frac{1}{192}\ (-11-5\ T)\ p_1^4\ x_1^3\ x_2 - \frac{1}{48}\ p_1^3\ p_2\ x_1^3\ x_2 + \frac{1}{64}\ \left(-2+3\ T-T^2\right)\ p_1^2\ x_2^2 + \frac{1}{32}\ p_1\ p_2\ x_2^2 +$

     $\frac{1}{48}\ \left(13-9\ T-4\ T^2\right)\ p_1^3\ x_1\ x_2^2 + \frac{1}{32}\ (-3-7\ T)\ p_1^2\ p_2\ x_1\ x_2^2 + \frac{1}{16}\ p_1\ p_2^2\ x_1\ x_2^2 + \frac{1}{64}\ \left(-7-T+8\ T^2\right)\ p_1^4\ x_1^2\ x_2^2 +$

     $\frac{1}{48}\ (1+9\ T)\ p_1^3\ p_2\ x_1^2\ x_2^2 - \frac{1}{8}\ p_1^2\ p_2^2\ x_1^2\ x_2^2 + \frac{1}{48}\ \left(-7\ T+8\ T^2-T^3\right)\ p_1^3\ x_2^3 + \frac{1}{16}\ \left(2+T^2\right)\ p_1^2\ p_2\ x_2^3 -$

     $\frac{1}{8}\ p_1\ p_2^2\ x_2^3 + \frac{1}{192}\ \left(5-7\ T+35\ T^2-33\ T^3\right)\ p_1^4\ x_1\ x_2^3 + \frac{1}{48}\ \left(-13+13\ T-12\ T^2\right)\ p_1^3\ p_2\ x_1\ x_2^3 +$

     $\frac{1}{32}\ (6+5\ T)\ p_1^2\ p_2^2\ x_1\ x_2^3 - \frac{1}{48}\ p_1\ p_2^3\ x_1\ x_2^3 + \frac{1}{192}\ \left(-4-5\ T+24\ T^2-35\ T^3+20\ T^4\right)\ p_1^4\ x_2^4 +$

     $\frac{1}{48}\ \left(2+11\ T-16\ T^2+9\ T^3\right)\ p_1^3\ p_2\ x_2^4 + \frac{1}{32}\ (-2-5\ T)\ p_1^2\ p_2^2\ x_2^4 + \frac{1}{24}\ p_1\ p_2^3\ x_2^4\Big]\Big]$

Slow *G*

$In[\bullet]:=$ **α = 4; β = 4;**

$In[\bullet]:=$ **rvk = RVK[K]**

$Out[\bullet]=$ RVK[{Xm[4, 1], Xm[6, 3], Xm[2, 5]}, {0, 0, 0, -1, 0, 0}]

$In[\bullet]:=$ **n = Length[rvk⟦1⟧]**

$Out[\bullet]=$ 3

$In[\bullet]:=$ **ξ = Times @@ rvk⟦1⟧ /. {Xp[$i\_$, $j\_$] :→ R0$_{i,j}$, Xm[$i\_$, $j\_$] :→ $\overline{R0}_{i,j}$}**

$Out[\bullet]=$ $\mathbb{E}_{\{\}\to\{1,2,3,4,5,6\}}\Big[\frac{1}{T^{3/2}},$

     $\left(-1+\frac{1}{T}\right)\ (-p_1+p_4)\ x_1 + \left(-1+\frac{1}{T}\right)\ (-p_3+p_6)\ x_3 + \left(-1+\frac{1}{T}\right)\ (p_2-p_5)\ x_5,\ \in$Series[0, 0]$\Big]$

$In[\bullet]:=$ ξ *= $\mathbb{E}_{\{\}\to\{0\}\cup\text{Table}[i-1/2,\{i,2n+1\}]}[1, 0, \epsilon\text{Series}[0, p_{\alpha-1/2} x_{\beta-1/2}]]$

$Out[\bullet]=$ $\mathbb{E}_{\{\}\to\{0,\frac{1}{2},1,\frac{3}{2},2,\frac{5}{2},3,\frac{7}{2},4,\frac{9}{2},5,\frac{11}{2},6,\frac{13}{2}\}}\Big[\dfrac{1}{T^{3/2}},$

$\left(-1 + \dfrac{1}{T}\right)(-p_1 + p_4) x_1 + \left(-1 + \dfrac{1}{T}\right)(-p_3 + p_6) x_3 + \left(-1 + \dfrac{1}{T}\right)(p_2 - p_5) x_5, \epsilon\text{Series}\Big[0, p_{\frac{7}{2}} x_{\frac{7}{2}}\Big]\Big]$

$In[\bullet]:=$ $\text{Do}[\xi = \xi // m_{0,k\to0}, \{k, 1/2, 2n+1/2, 1/2\}];$
ξ

$Out[\bullet]=$ $\mathbb{E}_{\{\}\to\{0\}}\Big[\dfrac{T^{3/2}}{1 - T + T^2}, 0, \epsilon\text{Series}\Big[0, \dfrac{1 - T + T^2 - T^3}{1 - T + T^2} + T p_0 x_0\Big]\Big]$

$In[\bullet]:=$ $\text{Factor}[\xi[\![3, 2]\!] /. (x \mid p)_0 \to 0]$

$Out[\bullet]=$ $-\dfrac{(-1 + T)(1 + T^2)}{1 - T + T^2}$

Fast ρ_1

$In[\bullet]:=$ $K = \text{GST48};$
$\text{Alexander}[K][T]$

$Out[\bullet]=$ $13 - \dfrac{1}{T^8} + \dfrac{2}{T^7} - \dfrac{1}{T^6} - \dfrac{2}{T^4} + \dfrac{5}{T^3} - \dfrac{2}{T^2} - \dfrac{7}{T} - 7T - 2T^2 + 5T^3 - 2T^4 - T^6 + 2T^7 - T^8$

$In[\bullet]:=$ **CF /@ $\{Rp_{1,2}, \overline{Rp}_{1,2}, C_1, \overline{C}_1\}$**

$Out[\bullet]=$ $\left\{ \mathbb{E}_{\{\}\to\{1,2\}}\left[1, 0, \epsilon\text{Series}\left[0, \frac{1}{4}(1-T) p_1^2 x_1 x_2 - \frac{1}{2} p_1 p_2 x_1 x_2 + \frac{1}{4}(-T+T^2) p_1^2 x_2^2 + \frac{1}{2} T p_1 p_2 x_2^2\right]\right], \right.$

$\mathbb{E}_{\{\}\to\{1,2\}}\left[1, 0, \epsilon\text{Series}\left[0, \frac{(1-T) p_1^2 x_1 x_2}{4 T} + \frac{1}{2} p_1 p_2 x_1 x_2 + \frac{(-1+T) p_1^2 x_2^2}{4 T^2} - \frac{p_1 p_2 x_2^2}{2 T}\right]\right],$

$\left. \mathbb{E}_{\{\}\to\{1\}}\left[\sqrt{T}, 0, \epsilon\text{Series}\left[0, \frac{p_1 x_1}{2}\right]\right], \mathbb{E}_{\{\}\to\{1\}}\left[\frac{1}{\sqrt{T}}, 0, \epsilon\text{Series}\left[0, -\frac{1}{2} p_1 x_1\right]\right]\right\}$

```
PAB1[K_] := Module[{rvk, n, B, c, s, i, j, ρ0, G, ρ1},
  rvk = RVK[K]; n = Length[rvk[[1]]]; B = Table[0, 2 n, 2 n + 1];
  Do[
   s = If[Head[c] === Xp, 1, -1]; {i, j} = List @@ c;
   B[[i, {i, i + 1}]] = {1, -1}; B[[j, {j, j + 1, i + 1}]] = {1, -T^-s, T^-s - 1},
   {c, rvk[[1]]}];
  ρ0 = Det[B[[ ;; , 2 ;;]]] // Factor;
  G = Table[0, 2 n, 2 n]; G[[ ;; , ;; 2 n - 1]] = Factor@Inverse[B[[ ;; , 2 ;;]]][[ ;; , 2 ;; 2 n]];
  ρ1 = Factor@Plus[
     Sum[
      s = If[Head[c] === Xp, 1, -1]; {i, j} = List @@ c;
      s (1 - T^s/2 G[[i, i]] G[[i, j]] - 1/2 (G[[i, i]] G[[j, j]] + G[[i, j]] G[[j, i]]) +
        T^(2 s) - T^s/2 G[[i, j]]^2 + T^s (G[[i, j]] G[[j, j]])), {c, rvk[[1]]}],
     Sum[rvk[[2, k]]/2 G[[k - 1, k - 1]], {k, 2, 2 n}]];
  {ρ0, ρ1}]
```

$In[\bullet]:=$ **Timing@PAB1[K]**

$Out[\bullet]=$ $\left\{78.6094, \left\{-\frac{(-1+2 T - T^2 - T^3 + 2 T^4 - T^5 + T^8)(-1 + T^3 - 2 T^4 + T^5 + T^6 - 2 T^7 + T^8)}{T^7}, \right.\right.$

$-\left(\left((-1+T)\left(13 - 45 T + 71 T^2 - 71 T^3 + 58 T^4 - 35 T^5 - 39 T^6 + 101 T^7 + 37 T^8 - 335 T^9 + 372 T^{10} + 56 T^{11} - \right.\right.\right.$
$506 T^{12} + 478 T^{13} - 114 T^{14} - 81 T^{15} - 31 T^{16} + 204 T^{17} - 270 T^{18} + 210 T^{19} + 8 T^{20} - 328 T^{21} +$
$\left.481 T^{22} - 311 T^{23} - 7 T^{24} + 169 T^{25} - 115 T^{26} - 10 T^{27} + 59 T^{28} - 31 T^{29} + T^{30} + 3 T^{31}\right)\right) \Big/$
$\left.\left.\left.\left(2(-1 + 2 T - T^2 - T^3 + 2 T^4 - T^5 + T^8)^2(-1 + T^3 - 2 T^4 + T^5 + T^6 - 2 T^7 + T^8)^2\right)\right)\right\}\right\}$

In[ ]:= **Timing@Factor@ZF[K]〚3, 2〛**

Out[ ]= $\Big\{3489.64,$

$-\Big(\Big(\,(-1+T)\;\big(13-45\,T+71\,T^2-71\,T^3+58\,T^4-35\,T^5-39\,T^6+101\,T^7+37\,T^8-335\,T^9+372\,T^{10}+56\,T^{11}-$

$506\,T^{12}+478\,T^{13}-114\,T^{14}-81\,T^{15}-31\,T^{16}+204\,T^{17}-270\,T^{18}+210\,T^{19}+8\,T^{20}-328\,T^{21}+$

$481\,T^{22}-311\,T^{23}-7\,T^{24}+169\,T^{25}-115\,T^{26}-10\,T^{27}+59\,T^{28}-31\,T^{29}+T^{30}+3\,T^{31}\big)\Big)\,\Big/$

$\Big(2\;\big(-1+2\,T-T^2-T^3+2\,T^4-T^5+T^8\big)^2\;\big(-1+T^3-2\,T^4+T^5+T^6-2\,T^7+T^8\big)^2\Big)\Big)\Big\}$