Pensieve header: Testing Profile.m using 1-smidgen computations.

Initialization

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\Profile"];
Once[<< KnotTheory`];
Once[<< Profile.m]
```

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

This is Profile.m. This version: January 2017. Original version: July 1994.
```

```
? BeginProfile
```

Info43692426503-6192448

BeginProfile[] begins a profiling session, with root name ProfileRoot. BeginProfile[root] does same with root name root.

```
? ProfileData
```

Info53692426504-6192448

The result of EndProfile. Has format ProfileData[root,calls,total,self], where root is the profile rootlabel, calls is a linear combination of tags with head Called, andtotal and self are linear combinations of tags with head TimeUnder.

Rotational Virtual Knots

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

NOE-1t

Logos

```
\[CapitalLambda][k_] := (1 - t_k) (\[Alpha]^2 \[Beta]^2 + 4 \[Alpha] \[Beta] \[Delta] \[Mu] + 2 \[Delta]^2 \[Mu]^2) / 2 + 2 \[Mu]^2 (\[Alpha] \[Beta] + \[Delta] \[Mu]) c_k - \[Beta] (2 \[Mu] - 1) (\[Alpha] \[Beta] + 2 \[Delta] \[Mu]) u_k +
   2 \[Beta] \[Delta] \[Mu]^2 c_k u_k - \[Beta]^2 \[Delta] (3 \[Mu] - 1) * u_k^2 / 2 + \[Alpha] (\[Alpha] \[Beta] + 2 \[Delta] \[Mu]) w_k + 2 \[Alpha] \[Delta] \[Mu]^2 c_k w_k - 2 (t_k - 1) \[Delta]^2 (\[Alpha] \[Beta] + \[Delta] \[Mu]) u_k w_k +
   2 \[Delta]^2 \[Mu]^2 c_k u_k w_k - \[Beta] \[Delta]^2 (2 \[Mu] - 1) * u_k^2 w_k + \[Alpha]^2 \[Delta] (1 + \[Mu]) w_k^2 / 2 + \[Alpha] \[Delta]^2 u_k * w_k^2 - (t_k - 1) \[Delta]^4 * u_k^2 * w_k^2 / 2;
```

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

```
CF[𝔼[ω_, L_, Q_, P_]] := PP_CF[
    Expand /@ PP_Together[
      Together /@
       𝔼[ω /. b_L_ :> Log[t_L], L, Q /. b_L_ :> Log[t_L], P /. b_L_ :> Log[t_L]]
     ]
   ];
𝔼 /: 𝔼[ω1_, L1_, Q1_, P1_] 𝔼[ω2_, L2_, Q2_, P2_] := CF@𝔼[ω1 ω2, L1 + L2, ω2 Q1 + ω1 Q2, ω2^4 P1 + ω1^4 P2];
```

```
N_{u_i_ c_j_→k_}[𝔼[ω_, L_, Q_, P_]] := PP_Nuc@With[{q = e^(-γ) β u_k + γ c_k}, CF[
      𝔼[ω, γ c_k + (L /. c_j → 0), ω e^(-γ) β u_k + (Q /. u_i → 0), e^(-q) DP_{c_j→D_γ, u_i→D_β}[P][e^q]] /. {γ → ∂_{c_j} L, β → ω^(-1) ∂_{u_i} Q}]];
N_{w_i_ c_j_→k_}[𝔼[ω_, L_, Q_, P_]] := PP_Nwc@With[{q = e^(γ) α w_k + γ c_k}, CF[
      𝔼[ω, γ c_k + (L /. c_j → 0), ω e^(γ) α w_k + (Q /. w_i → 0), e^(-q) DP_{c_j→D_γ, w_i→D_α}[P][e^q]] /. {γ → ∂_{c_j} L, α → ω^(-1) ∂_{w_i} Q}]];
```

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

```
m_{i_, j_→k_}[Z_] := PP_m@Module[{x, y, z},
    Z // N_{w_i c_j→x} // N_{w_x u_j→y} // ReplaceAll[{c_{x|y} → c_x, w_j → w_y}] // N_{u_i c_x→x} // ReplaceAll[z_{_i|j|x|y} → z_k] // CF];
```

```
R^+_{i_,j_} := 𝔼[1, b_i c_j, u_i w_j, -c_i (t_i - 1)^2/2 - c_i^2 (t_i - 1)^2/2 + c_i c_j (t_j^2 - t_i - 2)/2 - c_j u_i w_i/2 + c_i (1 - t_i) u_i w_i -
    u_i^2 w_i^2/2 + u_i w_j + c_j t_i u_i w_j/2 + c_i (t_i - 2) t_i u_i w_j + c_i (1 + t_j) u_j w_j/2 + (t_i - 1) u_i^2 w_i w_j - (t_i - 2) t_i u_i^2 w_j^2/2];
R^-_{i_,j_} := 𝔼[1, -b_i c_j, -t_i^(-1) u_i w_j, c_i (t_i - 1)^2/2 + c_i^2 (t_i - 1)^2/2 + c_i c_j (2 + t_i - t_j^2)/2 + c_j u_i w_i/2 +
    c_i (t_i - 1) u_i w_i + u_i^2 w_i^2/2 + (1 - t_i^(-1)) u_i w_j/2 + c_i (2 t_i - 5 + 3 t_i^(-1)) u_i w_j/2 + c_j (t_i^(-1) + 1 - t_i^(-1) t_j^2) u_i w_j/2 -
    c_i (t_j + 1) u_j w_j/2 + (2 - 3 t_i^(-1)) u_i^2 w_i w_j/2 + (1 + 2 t_i^(-2) - 3 t_i^(-1)) u_i^2 w_j^2/2 - t_i^(-1) (1 + t_j) u_i u_j w_j^2/2];
ur_i_ := 𝔼[t_i^(-1/4), 0, 0, c_i t_i/4 + u_i w_i/8];
nr_i_ := 𝔼[t_i^(1/4), 0, 0, -c_i t_i^3/4 - t_i^2 u_i w_i/8];
ul_i_ := 𝔼[t_i^(1/4), 0, 0, c_i t_i (4 + t_i)/4 - t_i^2 u_i w_i/8];
nl_i_ := 𝔼[t_i^(-1/4), 0, 0, -c_i (1 + 4 t_i^(-1))/4 + u_i w_i/8];
```

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

Z

```
t_ = t;
Z[K_] := Z[RVK@K];
Z[rvk_RVK] := PPz@Module[{todo, n, rots, ℱ, done, st, x, ℱ1, i, j, k, k1, k2, k3},
   {todo, rots} = List@@rvk;
   AppendTo[rots, 0];
   n = Length[todo];
   ℱ = 𝔼[1, 0, 0, 0];
   done = {0};
   st = Range[0, 2 n + 1];
   While[todo =!= {},
    {x} = MaximalBy[todo, Length[done ⋂ {#[[1]], #[[2]], #[[1]] - 1, #[[2]] - 1}] &, 1];
    Z$todo = todo; Z$x = x;
    {i, j} = List@@x;
    ℱ1 = Switch[Head[x],
       Xp, m_{j,k→j}[R^+_{i,j} (R^-_{k3,k} nr_{k1} ul_{k2} // m_{k,k1→k} // m_{k,k2→k} // m_{k,k3→k})],
       Xm, m_{j,k→j}[R^-_{i,j} (R^+_{k,k3} nr_{k1} ul_{k2} // m_{k,k1→k} // m_{k,k2→k} // m_{k,k3→k})]
     ];
    ℱ1 = rot[k, rots[[i]]] ℱ1 // m_{k,i→i}; rots[[i]] = 0;
    ℱ1 = ℱ1 rot[k, rots[[i + 1]]] // m_{i,k→i}; rots[[i + 1]] = 0;
    ℱ1 = rot[k, rots[[j]]] ℱ1 // m_{k,j→j}; rots[[j]] = 0;
    ℱ1 = ℱ1 rot[k, rots[[j + 1]]] // m_{j,k→j}; rots[[j + 1]] = 0;
    ℱ *= ℱ1;
    If[MemberQ[done, i], ℱ = ℱ // m_{i,i+1→i}; st = st /. st[[i + 2]] → st[[i + 1]]];
    If[MemberQ[done, i - 1], ℱ = ℱ // m_{st[[i]],i→st[[i]]}; st = st /. st[[i + 1]] → st[[i]]];
    If[MemberQ[done, j], ℱ = ℱ // m_{j,j+1→j}; st = st /. st[[j + 2]] → st[[j + 1]]];
    If[MemberQ[done, j - 1], ℱ = ℱ // m_{st[[j]],j→st[[j]]}; st = st /. st[[j + 1]] → st[[j]]];
    done = done ⋃ {i - 1, i, j - 1, j};
    todo = DeleteCases[todo, x]
   ];
   ℱ /. {u0 → u, c0 → c, w0 → w}
  ]
```

Testing ...

```
Timing[Z[Knot[10, 100]]]
```

KnotTheory: Loading precomputed data in PD4Knots`.

$$\{16.5, \mathbb{E}\Big[13+\frac{1}{t^4}-\frac{4}{t^3}+\frac{9}{t^2}-\frac{12}{t}-12\,t+9\,t^2-4\,t^3+t^4, 0, 0,$$
$$2\,563\,146+667\,500\,c+\frac{6}{t^{16}}-\frac{8\,c}{t^{16}}-\frac{92}{t^{15}}+\frac{118\,c}{t^{15}}+\frac{723}{t^{14}}-\frac{892\,c}{t^{14}}-\frac{3818}{t^{13}}+\frac{4523\,c}{t^{13}}+\frac{15\,133}{t^{12}}-\frac{17\,161\,c}{t^{12}}-\frac{47\,848}{t^{11}}+$$
$$\frac{51\,709\,c}{t^{11}}+\frac{125\,539}{t^{10}}-\frac{128\,505\,c}{t^{10}}-\frac{281\,054}{t^9}+\frac{270\,279\,c}{t^9}+\frac{548\,129}{t^8}-\frac{489\,715\,c}{t^8}-\frac{945\,756}{t^7}+\frac{772\,841\,c}{t^7}+\frac{1\,460\,263}{t^6}-$$
$$\frac{1\,066\,829\,c}{t^6}-\frac{2\,034\,106}{t^5}+\frac{1\,282\,861\,c}{t^5}+\frac{2\,570\,432}{t^4}-\frac{1\,320\,331\,c}{t^4}-\frac{2\,956\,518}{t^3}+\frac{1\,107\,336\,c}{t^3}+\frac{3\,099\,338}{t^2}-\frac{640\,054\,c}{t^2}-$$
$$\frac{2\,958\,726}{t}-\frac{540\,c}{t}-2\,000\,454\,t-1\,197\,840\,c\,t+1\,387\,610\,t^2+1\,472\,160\,c\,t^2-832\,998\,t^3-1\,456\,020\,c\,t^3+407\,256\,t^4+$$
$$1\,204\,364\,c\,t^4-132\,546\,t^5-829\,886\,c\,t^5-9557\,t^6+453\,636\,c\,t^6+59\,220\,t^7-162\,131\,c\,t^7-58\,859\,t^8-11\,711\,c\,t^8+$$
$$40\,498\,t^9+81\,439\,c\,t^9-22\,001\,t^{10}-84\,595\,c\,t^{10}+9704\,t^{11}+59\,721\,c\,t^{11}-3455\,t^{12}-32\,685\,c\,t^{12}+966\,t^{13}+$$
$$14\,251\,c\,t^{13}-201\,t^{14}-4919\,c\,t^{14}+28\,t^{15}+1307\,c\,t^{15}-2\,t^{16}-253\,c\,t^{16}+32\,c\,t^{17}-2\,c\,t^{18}-493\,132\,u\,w+\frac{8\,u\,w}{t^{16}}-$$
$$\frac{110\,u\,w}{t^{15}}+\frac{782\,u\,w}{t^{14}}-\frac{3741\,u\,w}{t^{13}}+\frac{13\,420\,u\,w}{t^{12}}-\frac{38\,289\,u\,w}{t^{11}}+\frac{90\,216\,u\,w}{t^{10}}-\frac{180\,063\,u\,w}{t^9}+\frac{309\,652\,u\,w}{t^8}-\frac{463\,189\,u\,w}{t^7}+$$
$$\frac{603\,640\,u\,w}{t^6}-\frac{679\,221\,u\,w}{t^5}+\frac{641\,110\,u\,w}{t^4}-\frac{466\,226\,u\,w}{t^3}+\frac{173\,828\,u\,w}{t^2}+\frac{174\,368\,u\,w}{t}+704\,708\,t\,u\,w-767\,452\,t^2\,u\,w+$$
$$688\,568\,t^3\,u\,w-515\,796\,t^4\,u\,w+314\,090\,t^5\,u\,w-139\,546\,t^6\,u\,w+22\,585\,t^7\,u\,w+34\,296\,t^8\,u\,w-47\,143\,t^9\,u\,w+$$
$$37\,452\,t^{10}\,u\,w-22\,269\,t^{11}\,u\,w+10\,416\,t^{12}\,u\,w-3835\,t^{13}\,u\,w+1084\,t^{14}\,u\,w-223\,t^{15}\,u\,w+30\,t^{16}\,u\,w-2\,t^{17}\,u\,w\Big]\}$$

```
BeginProfile[];
Timing[Z[Knot[10, 100]]]
EndProfile[];
```

$$\{16.4531, \mathbb{E}\Big[13+\frac{1}{t^4}-\frac{4}{t^3}+\frac{9}{t^2}-\frac{12}{t}-12\,t+9\,t^2-4\,t^3+t^4, 0, 0,$$
$$2\,563\,146+667\,500\,c+\frac{6}{t^{16}}-\frac{8\,c}{t^{16}}-\frac{92}{t^{15}}+\frac{118\,c}{t^{15}}+\frac{723}{t^{14}}-\frac{892\,c}{t^{14}}-\frac{3818}{t^{13}}+\frac{4523\,c}{t^{13}}+\frac{15\,133}{t^{12}}-\frac{17\,161\,c}{t^{12}}-\frac{47\,848}{t^{11}}+$$
$$\frac{51\,709\,c}{t^{11}}+\frac{125\,539}{t^{10}}-\frac{128\,505\,c}{t^{10}}-\frac{281\,054}{t^9}+\frac{270\,279\,c}{t^9}+\frac{548\,129}{t^8}-\frac{489\,715\,c}{t^8}-\frac{945\,756}{t^7}+\frac{772\,841\,c}{t^7}+\frac{1\,460\,263}{t^6}-$$
$$\frac{1\,066\,829\,c}{t^6}-\frac{2\,034\,106}{t^5}+\frac{1\,282\,861\,c}{t^5}+\frac{2\,570\,432}{t^4}-\frac{1\,320\,331\,c}{t^4}-\frac{2\,956\,518}{t^3}+\frac{1\,107\,336\,c}{t^3}+\frac{3\,099\,338}{t^2}-\frac{640\,054\,c}{t^2}-$$
$$\frac{2\,958\,726}{t}-\frac{540\,c}{t}-2\,000\,454\,t-1\,197\,840\,c\,t+1\,387\,610\,t^2+1\,472\,160\,c\,t^2-832\,998\,t^3-1\,456\,020\,c\,t^3+407\,256\,t^4+$$
$$1\,204\,364\,c\,t^4-132\,546\,t^5-829\,886\,c\,t^5-9557\,t^6+453\,636\,c\,t^6+59\,220\,t^7-162\,131\,c\,t^7-58\,859\,t^8-11\,711\,c\,t^8+$$
$$40\,498\,t^9+81\,439\,c\,t^9-22\,001\,t^{10}-84\,595\,c\,t^{10}+9704\,t^{11}+59\,721\,c\,t^{11}-3455\,t^{12}-32\,685\,c\,t^{12}+966\,t^{13}+$$
$$14\,251\,c\,t^{13}-201\,t^{14}-4919\,c\,t^{14}+28\,t^{15}+1307\,c\,t^{15}-2\,t^{16}-253\,c\,t^{16}+32\,c\,t^{17}-2\,c\,t^{18}-493\,132\,u\,w+\frac{8\,u\,w}{t^{16}}-$$
$$\frac{110\,u\,w}{t^{15}}+\frac{782\,u\,w}{t^{14}}-\frac{3741\,u\,w}{t^{13}}+\frac{13\,420\,u\,w}{t^{12}}-\frac{38\,289\,u\,w}{t^{11}}+\frac{90\,216\,u\,w}{t^{10}}-\frac{180\,063\,u\,w}{t^9}+\frac{309\,652\,u\,w}{t^8}-\frac{463\,189\,u\,w}{t^7}+$$
$$\frac{603\,640\,u\,w}{t^6}-\frac{679\,221\,u\,w}{t^5}+\frac{641\,110\,u\,w}{t^4}-\frac{466\,226\,u\,w}{t^3}+\frac{173\,828\,u\,w}{t^2}+\frac{174\,368\,u\,w}{t}+704\,708\,t\,u\,w-767\,452\,t^2\,u\,w+$$
$$688\,568\,t^3\,u\,w-515\,796\,t^4\,u\,w+314\,090\,t^5\,u\,w-139\,546\,t^6\,u\,w+22\,585\,t^7\,u\,w+34\,296\,t^8\,u\,w-47\,143\,t^9\,u\,w+$$
$$37\,452\,t^{10}\,u\,w-22\,269\,t^{11}\,u\,w+10\,416\,t^{12}\,u\,w-3835\,t^{13}\,u\,w+1084\,t^{14}\,u\,w-223\,t^{15}\,u\,w+30\,t^{16}\,u\,w-2\,t^{17}\,u\,w\Big]\}$$

```
prof = PrintProfile[]
```

```
Together: called 490 times, time in 13.81/13.81
  Parents:
    ( 490)  13.810/ 13.810 under CF
DP: called 306 times, time in 1.094/1.094
  Parents:
    ( 102)  0.377/ 0.377 under Nuc
    ( 102)  0.345/ 0.345 under Nwc
    ( 102)  0.372/ 0.372 under Nwu
CF: called 490 times, time in 0.765/14.575
  Parents:
    ( 102)  0.140/ 1.109 under m
    ( 102)  0.218/ 3.079 under Nuc
    ( 102)  0.125/ 2.267 under Nwc
    ( 102)  0.204/ 7.448 under Nwu
    (  82)  0.078/ 0.672 under z
  Children:
    ( 490)  13.810/ 13.810 above Together
m: called 102 times, time in 0.329/15.75
  Parents:
    ( 102)  0.329/ 15.750 under z
  Children:
    ( 102)  0.140/ 1.109 above CF
    ( 102)  0.077/ 3.533 above Nuc
    ( 102)  0.093/ 2.705 above Nwc
    ( 102)  0.254/ 8.074 above Nwu
Nwu: called 102 times, time in 0.254/8.074
  Parents:
    ( 102)  0.254/ 8.074 under m
  Children:
    ( 102)  0.204/ 7.448 above CF
    ( 102)  0.372/ 0.372 above DP
Nwc: called 102 times, time in 0.093/2.705
  Parents:
    ( 102)  0.093/ 2.705 under m
  Children:
    ( 102)  0.125/ 2.267 above CF
    ( 102)  0.345/ 0.345 above DP
Nuc: called 102 times, time in 0.077/3.533
  Parents:
    ( 102)  0.077/ 3.533 under m
  Children:
    ( 102)  0.218/ 3.079 above CF
    ( 102)  0.377/ 0.377 above DP
z: called 1 times, time in 0.016/16.438
  Parents:
    (   1)  0.016/ 16.440 under ProfileRoot
  Children:
    (  82)  0.078/ 0.672 above CF
    ( 102)  0.329/ 15.750 above m
ProfileRoot: called 0 times, time in 0./0.
  Children:
    (   1)  0.016/ 16.440 above z
```

```
BeginProfile[];
Timing[Z[TorusKnot[9, 5]]]
EndProfile[];
```

$$\Big\{1153.8,\ \mathbb{E}\Big[-1+\frac{1}{t^{16}}-\frac{1}{t^{15}}+\frac{1}{t^{11}}-\frac{1}{t^{10}}+\frac{1}{t^{7}}-\frac{1}{t^{5}}+\frac{1}{t^{2}}+t^2-t^5+t^7-t^{10}+t^{11}-t^{15}+t^{16},\ 0,\ 0,$$

$$-7580-\frac{211\,c}{2}-\frac{32\,c}{t^{64}}+\frac{1}{t^{63}}+\frac{118\,c}{t^{63}}-\frac{3}{t^{62}}-\frac{293\,c}{2\,t^{62}}+\frac{3}{t^{61}}+\frac{44\,c}{t^{61}}-\frac{1}{t^{60}}+\frac{47\,c}{t^{60}}-\frac{1}{t^{59}}-\frac{156\,c}{t^{59}}+\frac{8}{t^{58}}+\frac{442\,c}{t^{58}}-\frac{18}{t^{57}}-\frac{1077\,c}{2\,t^{57}}+$$
$$\frac{16}{t^{56}}+\frac{161\,c}{t^{56}}-\frac{6}{t^{55}}+\frac{63\,c}{t^{55}}+\frac{3}{t^{54}}-\frac{5\,c}{t^{54}}+\frac{12}{t^{53}}+\frac{1039\,c}{2\,t^{53}}-\frac{44}{t^{52}}-\frac{2157\,c}{2\,t^{52}}+\frac{45}{t^{51}}+\frac{526\,c}{t^{51}}-\frac{25}{t^{50}}-\frac{269\,c}{2\,t^{50}}+\frac{41}{t^{49}}+\frac{686\,c}{t^{49}}-\frac{28}{t^{48}}+$$
$$\frac{48\,c}{t^{48}}-\frac{62}{t^{47}}-\frac{3363\,c}{2\,t^{47}}+\frac{89}{t^{46}}+\frac{1009\,c}{t^{46}}-\frac{45}{t^{45}}+\frac{379\,c}{2\,t^{45}}+\frac{105}{t^{44}}+\frac{1007\,c}{t^{44}}-\frac{135}{t^{43}}-\frac{820\,c}{t^{43}}-\frac{50}{t^{42}}-\frac{1940\,c}{t^{42}}+\frac{125}{t^{41}}+\frac{2475\,c}{2\,t^{41}}+$$
$$\frac{20}{t^{40}}+\frac{3045\,c}{2\,t^{40}}+\frac{90}{t^{39}}+\frac{771\,c}{2\,t^{39}}-\frac{284}{t^{38}}-\frac{1932\,c}{t^{38}}-\frac{3}{t^{37}}-\frac{1979\,c}{t^{37}}+\frac{188}{t^{36}}+\frac{4673\,c}{2\,t^{36}}+\frac{179}{t^{35}}+\frac{4759\,c}{2\,t^{35}}-\frac{86}{t^{34}}-\frac{1877\,c}{2\,t^{34}}-\frac{437}{t^{33}}-$$
$$\frac{5201\,c}{2\,t^{33}}+\frac{32}{t^{32}}-\frac{4617\,c}{2\,t^{32}}+\frac{491}{t^{31}}+\frac{9827\,c}{2\,t^{31}}+\frac{214}{t^{30}}+\frac{3801\,c}{2\,t^{30}}-\frac{402}{t^{29}}-\frac{5375\,c}{2\,t^{29}}-\frac{593}{t^{28}}-\frac{2928\,c}{t^{28}}+\frac{131}{t^{27}}-\frac{2767\,c}{2\,t^{27}}+\frac{1110}{t^{26}}+$$
$$\frac{6791\,c}{t^{26}}-\frac{75}{t^{25}}+\frac{891\,c}{2\,t^{25}}-\frac{804}{t^{24}}-\frac{7693\,c}{2\,t^{24}}-\frac{858}{t^{23}}-\frac{7019\,c}{2\,t^{23}}+\frac{738}{t^{22}}+\frac{1421\,c}{t^{22}}+\frac{1669}{t^{21}}+\frac{6804\,c}{t^{21}}-\frac{695}{t^{20}}-\frac{3051\,c}{2\,t^{20}}-\frac{1341}{t^{19}}-$$
$$\frac{4382\,c}{t^{19}}-\frac{989}{t^{18}}-\frac{2704\,c}{t^{18}}+\frac{1903}{t^{17}}+\frac{3557\,c}{t^{17}}+\frac{1900}{t^{16}}+\frac{5333\,c}{t^{16}}-\frac{1613}{t^{15}}-\frac{5527\,c}{2\,t^{15}}-\frac{2246}{t^{14}}-\frac{9483\,c}{2\,t^{14}}-\frac{122}{t^{13}}-\frac{471\,c}{2\,t^{13}}+\frac{2952}{t^{12}}+$$
$$\frac{3834\,c}{t^{12}}+\frac{1811}{t^{11}}+\frac{2991\,c}{t^{11}}-\frac{3013}{t^{10}}-\frac{6079\,c}{2\,t^{10}}-\frac{2956}{t^{9}}-\frac{3551\,c}{t^{9}}+\frac{1656}{t^{8}}+\frac{2677\,c}{2\,t^{8}}+\frac{3603}{t^{7}}+\frac{2657\,c}{t^{7}}+\frac{1390}{t^{6}}+\frac{2131\,c}{2\,t^{6}}-$$
$$\frac{5340}{t^{5}}-\frac{4827\,c}{2\,t^{5}}-\frac{2004}{t^{4}}-\frac{1253\,c}{t^{4}}+\frac{3247}{t^{3}}+\frac{1098\,c}{t^{3}}+\frac{3938}{t^{2}}+\frac{1537\,c}{2\,t^{2}}+\frac{219}{t}+\frac{33\,c}{2\,t}+281\,t-\frac{155\,c\,t}{2}+4422\,t^2-$$
$$\frac{999\,c\,t^2}{2}+3913\,t^3-\frac{1543\,c\,t^3}{2}-2476\,t^4+\frac{853\,c\,t^4}{2}-7540\,t^5+\frac{4969\,c\,t^5}{2}+2314\,t^6-492\,c\,t^6+5381\,t^7-2559\,c\,t^7+$$
$$2868\,t^8-\frac{2851\,c\,t^8}{2}-5260\,t^9+\frac{4891\,c\,t^9}{2}-5823\,t^{10}+3689\,c\,t^{10}+3989\,t^{11}-\frac{4103\,c\,t^{11}}{2}+6048\,t^{12}-4343\,c\,t^{12}-$$
$$278\,t^{13}-\frac{147\,c\,t^{13}}{2}-5354\,t^{14}+3921\,c\,t^{14}-4403\,t^{15}+3528\,c\,t^{15}+5644\,t^{16}-\frac{7647\,c\,t^{16}}{2}+5541\,t^{17}-\frac{10\,543\,c\,t^{17}}{2}-$$
$$3707\,t^{18}+\frac{5489\,c\,t^{18}}{2}-3735\,t^{19}+3983\,c\,t^{19}-3145\,t^{20}+2369\,c\,t^{20}+7171\,t^{21}-5488\,c\,t^{21}+2542\,t^{22}-3792\,c\,t^{22}-$$
$$4262\,t^{23}+\frac{8657\,c\,t^{23}}{2}-2676\,t^{24}+3174\,c\,t^{24}-1525\,t^{25}+1067\,c\,t^{25}+7558\,t^{26}-\frac{13\,107\,c\,t^{26}}{2}-1003\,t^{27}-\frac{1681\,c\,t^{27}}{2}-$$
$$3099\,t^{28}+\frac{8803\,c\,t^{28}}{2}-1910\,t^{29}+1851\,c\,t^{29}+394\,t^{30}-\frac{859\,c\,t^{30}}{2}+5389\,t^{31}-5320\,c\,t^{31}-1952\,t^{32}+\frac{1609\,c\,t^{32}}{2}-$$
$$2483\,t^{33}+\frac{7533\,c\,t^{33}}{2}-834\,t^{34}+\frac{1527\,c\,t^{34}}{2}+1649\,t^{35}-\frac{3589\,c\,t^{35}}{2}+2420\,t^{36}-\frac{5573\,c\,t^{36}}{2}-1409\,t^{37}+\frac{2431\,c\,t^{37}}{2}-$$
$$2108\,t^{38}+\frac{5467\,c\,t^{38}}{2}+558\,t^{39}-\frac{727\,c\,t^{39}}{2}+920\,t^{40}-1473\,c\,t^{40}+1355\,t^{41}-1338\,c\,t^{41}-1310\,t^{42}+\frac{2355\,c\,t^{42}}{2}-$$
$$1425\,t^{43}+\frac{3825\,c\,t^{43}}{2}+1535\,t^{44}-\frac{2845\,c\,t^{44}}{2}-495\,t^{45}-230\,c\,t^{45}+1331\,t^{46}-772\,c\,t^{46}-1378\,t^{47}+893\,c\,t^{47}-$$
$$412\,t^{48}+\frac{2047\,c\,t^{48}}{2}+1119\,t^{49}-1311\,c\,t^{49}-675\,t^{50}+\frac{569\,c\,t^{50}}{2}+963\,t^{51}-486\,c\,t^{51}-1188\,t^{52}+752\,c\,t^{52}+436\,t^{53}+$$
$$\frac{183\,c\,t^{53}}{2}+165\,t^{54}-554\,c\,t^{54}-226\,t^{55}+\frac{571\,c\,t^{55}}{2}+464\,t^{56}-\frac{705\,c\,t^{56}}{2}-702\,t^{57}+517\,c\,t^{57}+472\,t^{58}-181\,c\,t^{58}-$$
$$119\,t^{59}-169\,c\,t^{59}-31\,t^{60}+\frac{351\,c\,t^{60}}{2}+125\,t^{61}-144\,c\,t^{61}-189\,t^{62}+148\,c\,t^{62}+127\,t^{63}-49\,c\,t^{63}-32\,t^{64}-$$
$$46\,c\,t^{64}+\frac{79\,c\,t^{65}}{2}-8\,c\,t^{66}-\frac{591\,u\,w}{2}+\frac{32\,u\,w}{t^{64}}-\frac{86\,u\,w}{t^{63}}+\frac{121\,u\,w}{2\,t^{62}}+\frac{33\,u\,w}{2\,t^{61}}-\frac{61\,u\,w}{2\,t^{60}}+\frac{251\,u\,w}{2\,t^{59}}-\frac{633\,u\,w}{2\,t^{58}}+\frac{222\,u\,w}{t^{57}}+$$
$$\frac{61\,u\,w}{t^{56}}-\frac{2\,u\,w}{t^{55}}+\frac{3\,u\,w}{t^{54}}-\frac{1033\,u\,w}{2\,t^{53}}+\frac{562\,u\,w}{t^{52}}+\frac{36\,u\,w}{t^{51}}+\frac{341\,u\,w}{2\,t^{50}}-\frac{1031\,u\,w}{2\,t^{49}}-\frac{1127\,u\,w}{2\,t^{48}}+\frac{1118\,u\,w}{t^{47}}+\frac{109\,u\,w}{t^{46}}-\frac{161\,u\,w}{2\,t^{45}}-$$
$$\frac{2175\,u\,w}{2\,t^{44}}-\frac{535\,u\,w}{2\,t^{43}}+\frac{3345\,u\,w}{2\,t^{42}}+\frac{435\,u\,w}{t^{41}}-\frac{2175\,u\,w}{2\,t^{40}}-\frac{1473\,u\,w}{t^{39}}+\frac{459\,u\,w}{t^{38}}+\frac{2438\,u\,w}{t^{37}}+\frac{203\,u\,w}{2\,t^{36}}-\frac{2278\,u\,w}{t^{35}}-\frac{2679\,u\,w}{2\,t^{34}}+$$
$$\frac{1261\,u\,w}{t^{33}}+\frac{7139\,u\,w}{2\,t^{32}}-\frac{1344\,u\,w}{t^{31}}-\frac{6489\,u\,w}{2\,t^{30}}-\frac{557\,u\,w}{t^{29}}+\frac{2371\,u\,w}{t^{28}}+\frac{7509\,u\,w}{2\,t^{27}}-\frac{6073\,u\,w}{2\,t^{26}}-\frac{3482\,u\,w}{t^{25}}+\frac{729\,u\,w}{2\,t^{24}}+$$
$$\frac{3874\,u\,w}{t^{23}}+\frac{2453\,u\,w}{t^{22}}-\frac{4351\,u\,w}{t^{21}}-\frac{5651\,u\,w}{2\,t^{20}}+\frac{3113\,u\,w}{2\,t^{19}}+\frac{8521\,u\,w}{2\,t^{18}}+\frac{1407\,u\,w}{2\,t^{17}}-\frac{9259\,u\,w}{2\,t^{16}}-\frac{1866\,u\,w}{t^{15}}+\frac{5751\,u\,w}{2\,t^{14}}+$$
$$\frac{3111\,u\,w}{t^{13}}-\frac{723\,u\,w}{t^{12}}-\frac{3714\,u\,w}{t^{11}}-\frac{1349\,u\,w}{2\,t^{10}}+\frac{5753\,u\,w}{2\,t^{9}}+\frac{1538\,u\,w}{t^{8}}-\frac{1119\,u\,w}{t^{7}}-\frac{4369\,u\,w}{2\,t^{6}}+\frac{229\,u\,w}{t^{5}}+\frac{1482\,u\,w}{t^{4}}+\frac{384\,u\,w}{t^{3}}-$$
$$\frac{769\,u\,w}{2\,t^{2}}-\frac{401\,u\,w}{t}-218\,t\,u\,w+\frac{563}{2}\,t^2\,u\,w+1053\,t^3\,u\,w+\frac{1253}{2}\,t^4\,u\,w-1858\,t^5\,u\,w-1366\,t^6\,u\,w+1193\,t^7\,u\,w+$$
$$\frac{5237}{2}\,t^8\,u\,w+173\,t^9\,u\,w-3516\,t^{10}\,u\,w-\frac{2929}{2}\,t^{11}\,u\,w+\frac{5757}{2}\,t^{12}\,u\,w+2952\,t^{13}\,u\,w-969\,t^{14}\,u\,w-4497\,t^{15}\,u\,w-$$
$$\frac{1347}{2}\,t^{16}\,u\,w+4598\,t^{17}\,u\,w+\frac{3707}{2}\,t^{18}\,u\,w-\frac{4259}{2}\,t^{19}\,u\,w-\frac{8997}{2}\,t^{20}\,u\,w+\frac{1979}{2}\,t^{21}\,u\,w+\frac{9563}{2}\,t^{22}\,u\,w+453\,t^{23}\,u\,w-$$
$$2721\,t^{24}\,u\,w-3788\,t^{25}\,u\,w+\frac{5531}{2}\,t^{26}\,u\,w+3606\,t^{27}\,u\,w-\frac{1591}{2}\,t^{28}\,u\,w-\frac{5293}{2}\,t^{29}\,u\,w-2217\,t^{30}\,u\,w+3103\,t^{31}\,u\,w+$$
$$\frac{4597}{2}\,t^{32}\,u\,w-1468\,t^{33}\,u\,w-\frac{4463}{2}\,t^{34}\,u\,w-437\,t^{35}\,u\,w+\frac{4699}{2}\,t^{36}\,u\,w+1134\,t^{37}\,u\,w-\frac{3199}{2}\,t^{38}\,u\,w-1236\,t^{39}\,u\,w+$$
$$237\,t^{40}\,u\,w+1575\,t^{41}\,u\,w+\frac{795}{2}\,t^{42}\,u\,w-1515\,t^{43}\,u\,w-\frac{185}{2}\,t^{44}\,u\,w+\frac{275}{2}\,t^{45}\,u\,w+\frac{1819}{2}\,t^{46}\,u\,w+\frac{33}{2}\,t^{47}\,u\,w-$$

$$1007\,t^{48}\,u\,w + 304\,t^{49}\,u\,w + \frac{39}{2}\,t^{50}\,u\,w + \frac{1011}{2}\,t^{51}\,u\,w - \frac{493}{2}\,t^{52}\,u\,w - 338\,t^{53}\,u\,w + 216\,t^{54}\,u\,w - \frac{139}{2}\,t^{55}\,u\,w + 283\,t^{56}\,u\,w - 234\,t^{57}\,u\,w - 53\,t^{58}\,u\,w + 116\,t^{59}\,u\,w - \frac{119}{2}\,t^{60}\,u\,w + \frac{169}{2}\,t^{61}\,u\,w - \frac{127}{2}\,t^{62}\,u\,w - \frac{29}{2}\,t^{63}\,u\,w + \frac{63}{2}\,t^{64}\,u\,w - 8\,t^{65}\,u\,w\Big]\Big\}$$

```
prof = PrintProfile[]
```

```
Together: called 1778 times, time in 1099.7/1099.7
  Parents:
    ( 1778)  1099.700/ 1099.700 under CF
DP: called 1110 times, time in 27.67/27.67
  Parents:
    ( 370)   10.226/  10.226 under Nuc
    ( 370)    8.692/   8.692 under Nwc
    ( 370)    8.752/   8.752 under Nwu
CF: called 1778 times, time in 14.036/1113.74
  Parents:
    ( 370)    2.625/ 103.610 under m
    ( 370)    3.428/ 172.223 under Nuc
    ( 370)    2.840/ 161.077 under Nwc
    ( 370)    4.142/ 642.395 under Nwu
    ( 298)    1.001/  34.430 under z
  Children:
    ( 1778)  1099.700/ 1099.700 above Together
m: called 370 times, time in 5.561/1118.82
  Parents:
    ( 370)    5.561/ 1118.820 under z
  Children:
    ( 370)    2.625/ 103.610 above CF
    ( 370)    1.464/ 183.913 above Nuc
    ( 370)    1.372/ 171.141 above Nwc
    ( 370)    3.449/ 654.596 above Nwu
Nwu: called 370 times, time in 3.449/654.596
  Parents:
    ( 370)    3.449/ 654.596 under m
  Children:
    ( 370)    4.142/ 642.395 above CF
    ( 370)    8.752/   8.752 above DP
Nuc: called 370 times, time in 1.464/183.913
  Parents:
    ( 370)    1.464/ 183.913 under m
  Children:
    ( 370)    3.428/ 172.223 above CF
    ( 370)   10.226/  10.226 above DP
Nwc: called 370 times, time in 1.372/171.141
  Parents:
    ( 370)    1.372/ 171.141 under m
  Children:
    ( 370)    2.840/ 161.077 above CF
    ( 370)    8.692/   8.692 above DP
z: called 1 times, time in 0.531/1153.78
  Parents:
    (   1)    0.531/ 1153.780 under ProfileRoot
  Children:
    ( 298)    1.001/  34.430 above CF
    ( 370)    5.561/ 1118.820 above m
ProfileRoot: called 0 times, time in 0./0.
  Children:
    (   1)    0.531/ 1153.780 above z
```

```
MakeImage["SampleProfile", prof]
```

```
Together: called 1778 times, time in 1099.7/1099.7
  Parents:
    ( 1778)  1099.700/ 1099.700 under CF
DP: called 1110 times, time in 27.67/27.67
  Parents:
    ( 370)   10.226/  10.226 under Nuc
    ( 370)    8.692/   8.692 under Nwc
    ( 370)    8.752/   8.752 under Nwu
CF: called 1778 times, time in 14.036/1113.74
  Parents:
    ( 370)    2.625/ 103.610 under m
    ( 370)    3.428/ 172.223 under Nuc
    ( 370)    2.840/ 161.077 under Nwc
    ( 370)    4.142/ 642.395 under Nwu
    ( 298)    1.001/  34.430 under z
  Children:
    ( 1778)  1099.700/ 1099.700 above Together
m: called 370 times, time in 5.561/1118.82
  Parents:
    ( 370)    5.561/ 1118.820 under z
  Children:
    ( 370)    2.625/ 103.610 above CF
    ( 370)    1.464/ 183.913 above Nuc
    ( 370)    1.372/ 171.141 above Nwc
    ( 370)    3.449/ 654.596 above Nwu
Nwu: called 370 times, time in 3.449/654.596
  Parents:
    ( 370)    3.449/ 654.596 under m
  Children:
    ( 370)    4.142/ 642.395 above CF
    ( 370)    8.752/   8.752 above DP
Nuc: called 370 times, time in 1.464/183.913
  Parents:
    ( 370)    1.464/ 183.913 under m
  Children:
    ( 370)    3.428/ 172.223 above CF
    ( 370)   10.226/  10.226 above DP
Nwc: called 370 times, time in 1.372/171.141
  Parents:
    ( 370)    1.372/ 171.141 under m
  Children:
    ( 370)    2.840/ 161.077 above CF
    ( 370)    8.692/   8.692 above DP
z: called 1 times, time in 0.531/1153.78
  Parents:
    (   1)    0.531/ 1153.780 under ProfileRoot
  Children:
    ( 298)    1.001/  34.430 above CF
    ( 370)    5.561/ 1118.820 above m
ProfileRoot: called 0 times, time in 0./0.
  Children:
    (   1)    0.531/ 1153.780 above z
```