Pensieve Header: Experimenting the "reverse double" in β-calculus.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-01"];
<< betaCalculus.m
<< KnotTheory`
GC[K_] := GC @@ (
    PD[K] /. X[i_, j_, k_, l_] :> If[PositiveQ[X[i, j, k, l]],
        Ar[l, i, +1], Ar[j, i, -1]
      ]
  )
```

```
Loading KnotTheory` version of August 22, 2010, 13:36:57.55.
Read more at http://katlas.org/wiki/KnotTheory.
```

```
bm[x_, y_, z_][β_] := β // conj[x, y] // hm[x, y, z] // tm[x, y, z];
```

```
(β_) ~BB~ (ν_) := Module[
  {ρ, σ, labels},
  ρ = β + (ν /. {h[s_] :> h[σ[s]], t[s_] :> t[σ[s]], c[s_] :> c[σ[s]]});
  labels = Union[Cases[{β, ν}, h[s_] | t[s_] | c[s_] :> s, Infinity]];
  Do[
   ρ = ρ // bm[s, σ[s], s],
   {s, labels}
  ];
  ρ
 ]
```

```
(W[1] + ar[1, 2]) ~BB~ (W[1] + ar[1, 3]) // βForm
```

$$\begin{pmatrix} W[1] & h[2] & h[3] \\ t[1] & 1 & 1 \end{pmatrix}$$

```
{(W[1] + ar[1, 3]) ~BB~ (W[1] + ar[2, 3]),
  (W[1] + ar[2, 3]) ~BB~ (W[1] + ar[1, 3])} // βForm
```

$$\left\{\begin{pmatrix} W[1] & h[3] \\ t[1] & 1 \\ t[2] & 1+c[1] \end{pmatrix}, \begin{pmatrix} W[1] & h[3] \\ t[1] & 1+c[2] \\ t[2] & 1 \end{pmatrix}\right\}$$

```
(W[1] + ar[1, 2]) ** (W[1] + ar[2, 3]) // βForm
```

$$\begin{pmatrix} W[1] & h[2] & h[3] \\ t[1] & 1 & \frac{c[2]}{1+c[1]} \\ t[2] & 0 & \frac{1}{1+c[1]} \end{pmatrix}$$

```
(W[1] + ar[1, 2]) ~BB~ (W[1] + ar[2, 3]) // βForm
```

$$\begin{pmatrix} W[1] & h[2] & h[3] \\ t[1] & 1 & 0 \\ t[2] & 0 & 1 \end{pmatrix}$$

```
(W[1] + ar[2, 3]) ~BB~ (W[1] + ar[1, 2]) // βForm
```

$$\begin{pmatrix} W[1] & h[2] & h[3] \\ t[1] & 1 & -c[2] \\ t[2] & 0 & 1+c[1] \end{pmatrix}$$

```
{ar[1, 2] ~BB~ ar[1, 3] ~BB~ ar[2, 3], ar[2, 3] ~BB~ ar[1, 3] ~BB~ ar[1, 2]} // βForm
```

$$\left\{\begin{pmatrix} 0 & h[2] & h[3] \\ t[1] & 1 & 1 \\ t[2] & 0 & 1+c[1] \end{pmatrix}, \begin{pmatrix} 0 & h[2] & h[3] \\ t[1] & 1 & 1 \\ t[2] & 0 & 1+c[1] \end{pmatrix}\right\}$$

```
{β3 = W[1] + Sum[α_{10 i+j}[c[1], c[2], c[3]] ar[i, j], {i, 3}, {j, 3}],
    β3 // bm[1, 2, 1]
   } /. e_[c[1], c[1], c[3]] :> e // βForm // ColumnForm
```

$$\begin{pmatrix} W[1] & h[1] & h[2] & h[3] \\ t[1] & \alpha_{11}[c[1], c[2], c[3]] & \alpha_{12}[c[1], c[2], c[3]] & \alpha_{13}[c[1], c[2], c[3]] \\ t[2] & \alpha_{21}[c[1], c[2], c[3]] & \alpha_{22}[c[1], c[2], c[3]] & \alpha_{23}[c[1], c[2], c[3]] \\ t[3] & \alpha_{31}[c[1], c[2], c[3]] & \alpha_{32}[c[1], c[2], c[3]] & \alpha_{33}[c[1], c[2], c[3]] \end{pmatrix}$$

$W[1 + c[1]\,\alpha_{12}]$

$t[1]$ $\quad \dfrac{\alpha_{11}+\alpha_{12}+2\,c[1]\,\alpha_{11}\,\alpha_{12}+c[1]\,\alpha_{12}^2+c[1]^2\,\alpha_{11}\,\alpha_{12}^2+\alpha_{21}+2\,c[1]\,\alpha_{12}\,\alpha_{21}+c[1]^2\,\alpha_{12}^2\,\alpha_{21}+\alpha_{22}+c[1]\,\alpha_{11}\,\alpha_{22}+c[1]\,\alpha_{12}\,\alpha_{22}+c[1}{}$

$t[3]$

```
(W[1] + ar[1, 2]) ~BB~ (W[1] + (-1)/(1 + c[1]) ar[1, 2]) // βForm
```

$\begin{pmatrix} W[1] \end{pmatrix}$

```
{β1 = W[1] + Sum[α_{10 i+j} ar[i, j], {i, 3}, {j, 3}] + ar[5, 6],
    β1 // bm[1, 5, 1],
    β1 // bm[2, 6, 2],
    β1 // bm[1, 5, 1] // dm[2, 6, 2]
   } /. c[i_] :> c_i // βForm // ColumnForm
```

$$\begin{pmatrix} W[1] & h[1] & h[2] & h[3] & h[6] \\ t[1] & \alpha_{11} & \alpha_{12} & \alpha_{13} & 0 \\ t[2] & \alpha_{21} & \alpha_{22} & \alpha_{23} & 0 \\ t[3] & \alpha_{31} & \alpha_{32} & \alpha_{33} & 0 \\ t[5] & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} W[1] & h[1] & h[2] & h[3] & h[6] \\ t[1] & \alpha_{11} & \alpha_{12} & \alpha_{13} & 1 \\ t[2] & \alpha_{21} & \alpha_{22} & \alpha_{23} & 0 \\ t[3] & \alpha_{31} & \alpha_{32} & \alpha_{33} & 0 \end{pmatrix}$$

$$\begin{pmatrix} W[1] & h[1] & h[2] & h[3] \\ t[1] & \alpha_{11} & \alpha_{12} & \alpha_{13} \\ t[2] & (1+c_5)\,\alpha_{21} & (1+c_5)\,\alpha_{22} & (1+c_5)\,\alpha_{23} \\ t[3] & \alpha_{31} & \alpha_{32} & \alpha_{33} \\ t[5] & -c_2\,\alpha_{21} & 1+c_1\,\alpha_{12}+c_3\,\alpha_{32} & -c_2\,\alpha_{23} \end{pmatrix}$$

$$\begin{pmatrix} W[1] & h[1] & h[2] & h[3] \\ t[1] & \alpha_{11} & 1+\alpha_{12}+c_1\,\alpha_{12}+c_2\,\alpha_{22}+c_3\,\alpha_{32} & \alpha_{13} \\ t[2] & \alpha_{21} & \alpha_{22} & \alpha_{23} \\ t[3] & \alpha_{31} & \alpha_{32} & \alpha_{33} \end{pmatrix}$$

```
{β1 = W[1] + Sum[α_{10 i+j} ar[i, j], {i, 3}, {j, 3}],
    β1 ~BB~ ar[1, 2],
    β1 ~BB~ (-1/(1 + c[1]) ar[1, 2])
  } /. c[i_] :> c_i // βForm // ColumnForm
```

W[1]	h[1]	h[2]	h[3]
t[1]	α_{11}	α_{12}	α_{13}
t[2]	α_{21}	α_{22}	α_{23}
t[3]	α_{31}	α_{32}	α_{33}

W[1]	h[1]	h[2]	h[3]
t[1]	$\alpha_{11} - c_2\,\alpha_{21}$	$1 + \alpha_{12} + c_1\,\alpha_{12} + c_3\,\alpha_{32}$	$\alpha_{13} - c_2\,\alpha_{23}$
t[2]	$(1 + c_1)\,\alpha_{21}$	$(1 + c_1)\,\alpha_{22}$	$(1 + c_1)\,\alpha_{23}$
t[3]	α_{31}	α_{32}	α_{33}

W[1]	h[1]	h[2]	h[3]
t[1]	$\frac{\alpha_{11}+c_1\,\alpha_{11}+c_2\,\alpha_{21}}{1+c_1}$	$\frac{-1+\alpha_{12}-c_3\,\alpha_{32}}{1+c_1}$	$\frac{\alpha_{13}+c_1\,\alpha_{13}+c_2\,\alpha_{23}}{1+c_1}$
t[2]	$\frac{\alpha_{21}}{1+c_1}$	$\frac{\alpha_{22}}{1+c_1}$	$\frac{\alpha_{23}}{1+c_1}$
t[3]	α_{31}	α_{32}	α_{33}

```
{β1 = W[1] + Sum[α_{10 i+j} ar[i, j], {i, 3}, {j, 3}],
    ar[1, 2] ~BB~ β1,
    (-1/(1 + c[1]) ar[1, 2]) ~BB~ β1
  } /. c[i_] :> c_i // βForm // ColumnForm
```

W[1]	h[1]	h[2]	h[3]
t[1]	α_{11}	α_{12}	α_{13}
t[2]	α_{21}	α_{22}	α_{23}
t[3]	α_{31}	α_{32}	α_{33}

W[1]	h[1]	h[2]	h[3]
t[1]	α_{11}	$1 + \alpha_{12} + c_1\,\alpha_{12} + c_2\,\alpha_{21} + c_3\,\alpha_{31}$	α_{13}
t[2]	α_{21}	$-c_1\,\alpha_{21} + \alpha_{22} + c_1\,\alpha_{22}$	α_{23}
t[3]	α_{31}	$-c_1\,\alpha_{31} + \alpha_{32} + c_1\,\alpha_{32}$	α_{33}

W[1]	h[1]	h[2]	h[3]
t[1]	α_{11}	$\frac{-1+\alpha_{12}-c_2\,\alpha_{21}-c_3\,\alpha_{31}}{1+c_1}$	α_{13}
t[2]	α_{21}	$\frac{c_1\,\alpha_{21}+\alpha_{22}}{1+c_1}$	α_{23}
t[3]	α_{31}	$\frac{c_1\,\alpha_{31}+\alpha_{32}}{1+c_1}$	α_{33}

```
n = 2;
{
    α1 = W[1] + Sum[α10 i+j ar[i, j], {i, n}, {j, n}],
    β1 = W[1] + Sum[β10 i+j ar[i, j], {i, n}, {j, n}],
    α1 ~ BB ~ β1
  } /. c[i_] :> c_i // βForm // ColumnForm
```

W[1]	h[1]	h[2]
t[1]	α_{11}	α_{12}
t[2]	α_{21}	α_{22}

W[1]	h[1]	h[2]
t[1]	β_{11}	β_{12}
t[2]	β_{21}	β_{22}

W[1]	h[1]	h[2]
t[1]	$\alpha_{11} + \beta_{11} + c_1\,\alpha_{11}\,\beta_{11} + c_2\,\alpha_{21}\,\beta_{11} - c_2\,\alpha_{21}\,\beta_{12} + c_2\,\alpha_{11}\,\beta_{21}$	$\alpha_{12} + \beta_{12} + c_1\,\alpha_{12}\,\beta_{12} + c_2\,\alpha_1$
t[2]	$\alpha_{21} + c_1\,\alpha_{21}\,\beta_{12} + \beta_{21} + c_2\,\alpha_{21}\,\beta_{21}$	$\alpha_{22} + c_1\,\alpha_{22}\,\beta_{12} - c_1\,\alpha_{12}\,\beta_{21} + \beta_{22} + c_1\,\alpha_1$

```
n = 3;
{
    α1 = W[1] + Sum[α10 i+j ar[i, j], {i, n}, {j, n}],
    β1 = W[1] + Sum[β10 i+j ar[i, j], {i, n}, {j, n}],
    α1 ~ BB ~ β1
  } /. c[i_] :> c_i // βForm // ColumnForm
```

W[1]	h[1]	h[2]	h[3]
t[1]	α_{11}	α_{12}	α_{13}
t[2]	α_{21}	α_{22}	α_{23}
t[3]	α_{31}	α_{32}	α_{33}

W[1]	h[1]	h[2]	h[3]
t[1]	β_{11}	β_{12}	β_{13}
t[2]	β_{21}	β_{22}	β_{23}
t[3]	β_{31}	β_{32}	β_{33}

W[1]	h[1]	
t[1]	$\alpha_{11} + \beta_{11} + c_1\,\alpha_{11}\,\beta_{11} + c_2\,\alpha_{21}\,\beta_{11} + c_3\,\alpha_{31}\,\beta_{11} - c_2\,\alpha_{21}\,\beta_{12} - c_3\,\alpha_{31}\,\beta_{13} + c_2\,\alpha_{11}\,\beta_{21} + c_3\,\alpha_{11}\,\beta_{31}$	
t[2]	$\alpha_{21} + c_1\,\alpha_{21}\,\beta_{12} + \beta_{21} + c_2\,\alpha_{21}\,\beta_{21} + c_3\,\alpha_{31}\,\beta_{21} - c_3\,\alpha_{31}\,\beta_{23} + c_3\,\alpha_{21}\,\beta_{32}$	α_{22}
t[3]	$\alpha_{31} + c_1\,\alpha_{31}\,\beta_{13} + c_2\,\alpha_{31}\,\beta_{23} + \beta_{31} + c_2\,\alpha_{21}\,\beta_{31} + c_3\,\alpha_{31}\,\beta_{31} - c_2\,\alpha_{21}\,\beta_{32}$	

```
{K = Knot[8, 17];
 Alexander[K][X], GC[K]
}
```

KnotTheory::loading : Loading precomputed data in PD4Knots`.

$\left\{11 - \frac{1}{X^3} + \frac{4}{X^2} - \frac{8}{X} - 8X + 4X^2 - X^3,\right.$ GC[Ar[1, 6, 1], Ar[7, 14, 1], Ar[3, 8, -1], Ar[13, 2, -1], Ar[5, 12, -1], Ar[9, 4, -1], Ar[11, 16, 1], Ar[15, 10, 1]]}

```
βAlex[K_] := Module[
  {gc, β},
  gc = GC[K];
  β = βCollect[
    Plus @@ (gc /. {Ar[i_, j_, +1] :> R[i, j], Ar[i_, j_, -1] :> RInv[i, j]})];
  Do[β = bm[1, k, 1][β], {k, 2, 2 Length[gc]}];
  Expand[β /. h[1] → 0 /. E^(n_. c[1]) :> X^n /. W[a_] :> a]
 ]
```

```
βAlex[K]
```

$$-8 - \frac{1}{X^2} + \frac{4}{X} + 11 X - 8 X^2 + 4 X^3 - X^4$$

```
βSimplify = Factor;
gc = GC[K];
Join[{β = βCollect[
      W[1] + Plus @@
        (gc /. {Ar[i_, j_, +1] :> ar[i, j], Ar[i_, j_, -1] :> -1/(1 + c[i]) ar[i, j]})
     ]},
   Table[β = bm[1, k, 1][β], {k, 2, 2 Length[gc]}]
  ] /. _c → c - 1 // βCollect // βForm // ColumnForm
```

W[1]	h[2]	h[4]	h[6]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	0	0	1	0	0	0	0	0
t[3]	0	0	0	$-\frac{1}{c}$	0	0	0	0
t[5]	0	0	0	0	0	$-\frac{1}{c}$	0	0
t[7]	0	0	0	0	0	0	1	0
t[9]	0	$-\frac{1}{c}$	0	0	0	0	0	0
t[11]	0	0	0	0	0	0	0	1
t[13]	$-\frac{1}{c}$	0	0	0	0	0	0	0
t[15]	0	0	0	0	1	0	0	0

W[1]	h[1]	h[4]	h[6]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	0	0	$\frac{1}{c}$	0	0	0	0	0
t[3]	0	0	0	$-\frac{1}{c}$	0	0	0	0
t[5]	0	0	0	0	0	$-\frac{1}{c}$	0	0
t[7]	0	0	0	0	0	0	1	0
t[9]	0	$-\frac{1}{c}$	0	0	0	0	0	0
t[11]	0	0	0	0	0	0	0	1
t[13]	$-\frac{1}{c}$	0	$\frac{-1+c}{c}$	0	0	0	0	0
t[15]	0	0	0	0	1	0	0	0

W[1]	h[1]	h[4]	h[6]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	0	0	$\frac{1}{c}$	$-\frac{1}{c}$	0	0	0	0
t[5]	0	0	0	0	0	$-\frac{1}{c}$	0	0
t[7]	0	0	0	0	0	0	1	0
t[9]	0	$-\frac{1}{c}$	0	0	0	0	0	0
t[11]	0	0	0	0	0	0	0	1
t[13]	$-\frac{1}{c}$	0	$\frac{-1+c}{c}$	0	0	0	0	0
t[15]	0	0	0	0	1	0	0	0

W[1]	h[1]	h[6]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	0	$\frac{1}{c^2}$	$-\frac{1}{c^2}$	0	0	0	0
t[5]	0	0	0	0	$-\frac{1}{c}$	0	0
t[7]	0	0	0	0	0	1	0
t[9]	$-\frac{1}{c^2}$	$\frac{-1+c}{c^2}$	$-\frac{-1+c}{c^2}$	0	0	0	0
t[11]	0	0	0	0	0	0	1
t[13]	$-\frac{1}{c}$	$\frac{-1+c}{c}$	0	0	0	0	0
t[15]	0	0	0	1	0	0	0

W[1]	h[1]	h[6]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	0	$\frac{1}{c^2}$	$-\frac{1}{c^2}$	0	$-\frac{1}{c}$	0	0
t[7]	0	0	0	0	0	1	0
t[9]	$-\frac{1}{c^2}$	$\frac{-1+c}{c^2}$	$-\frac{-1+c}{c^2}$	0	0	0	0
t[11]	0	0	0	0	0	0	1
t[13]	$-\frac{1}{c}$	$\frac{-1+c}{c}$	0	0	0	0	0
t[15]	0	0	0	1	0	0	0

$W\left[\frac{-1+c+c^2}{c^2}\right]$	h[1]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	$\frac{1}{c\,(-1+c+c^2)}$	$-\frac{c}{-1+c+c^2}$	0	$-\frac{c^2}{-1+c+c^2}$	0	0
t[7]	0	0	0	0	1	0
t[9]	$-\frac{1}{-1+c+c^2}$	$-\frac{-1+c}{-1+c+c^2}$	0	$\frac{(-1+c)^2}{c\,(-1+c+c^2)}$	0	0
t[11]	0	0	0	0	0	1
t[13]	$-\frac{c}{-1+c+c^2}$	$\frac{(-1+c)^2}{c\,(-1+c+c^2)}$	0	$\frac{(-1+c)^2}{-1+c+c^2}$	0	0
t[15]	0	0	1	0	0	0

$W\left[\frac{-1+c+c^2}{c^2}\right]$	h[1]	h[8]	h[10]	h[12]	h[14]	h[16]
t[1]	$\frac{1}{c\,(-1+c+c^2)}$	$-\frac{c}{-1+c+c^2}$	0	$-\frac{c^2}{-1+c+c^2}$	1	0
t[9]	$-\frac{1}{-1+c+c^2}$	$-\frac{-1+c}{-1+c+c^2}$	0	$\frac{(-1+c)^2}{c\,(-1+c+c^2)}$	0	0
t[11]	0	0	0	0	0	1
t[13]	$-\frac{c}{-1+c+c^2}$	$\frac{(-1+c)^2}{c\,(-1+c+c^2)}$	0	$\frac{(-1+c)^2}{-1+c+c^2}$	0	0
t[15]	0	0	1	0	0	0

$$\begin{pmatrix} W\left[\frac{-1+2c}{c^2}\right] & h[1] & h[10] & h[12] & h[14] & h[16] \\ t[1] & -\frac{-1+c}{c^2(-1+2c)} & 0 & -\frac{c}{-1+2c} & \frac{-1+c+c^2}{c(-1+2c)} & 0 \\ t[9] & -\frac{1}{-1+2c} & 0 & -\frac{(-1+c)^3}{c(-1+2c)} & \frac{(-1+c)^2}{-1+2c} & 0 \\ t[11] & 0 & 0 & 0 & 0 & 1 \\ t[13] & -\frac{1}{-1+2c} & 0 & \frac{(-1+c)^2}{-1+2c} & -\frac{(-1+c)^3}{c(-1+2c)} & 0 \\ t[15] & 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} W\left[\frac{-1+2c}{c^2}\right] & h[1] & h[10] & h[12] & h[14] & h[16] \\ t[1] & -\frac{-1+c+c^2}{c^2(-1+2c)} & 0 & -\frac{-1+3c-2c^2+c^3}{c(-1+2c)} & \frac{-1+2c-c^2+c^3}{c(-1+2c)} & 0 \\ t[11] & 0 & 0 & 0 & 0 & 1 \\ t[13] & -\frac{1}{-1+2c} & 0 & \frac{(-1+c)^2}{-1+2c} & -\frac{(-1+c)^3}{c(-1+2c)} & 0 \\ t[15] & 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} W\left[\frac{-1+2c}{c^2}\right] & h[1] & h[12] & h[14] & h[16] \\ t[1] & -\frac{-1+c+c^2}{c(-1+2c)} & -\frac{-1+3c-2c^2+c^3}{-1+2c} & \frac{-1+2c-c^2+c^3}{-1+2c} & 0 \\ t[11] & 0 & 0 & 0 & 1 \\ t[13] & -\frac{1}{-1+2c} & \frac{(-1+c)^2}{-1+2c} & -\frac{(-1+c)^3}{c(-1+2c)} & 0 \\ t[15] & \frac{c}{-1+2c} & \frac{(-1+c)(-1+3c-2c^2+c^3)}{c(-1+2c)} & -\frac{(-1+c)(-1+2c-c^2+c^3)}{c(-1+2c)} & 0 \end{pmatrix}$$

$$\begin{pmatrix} W\left[\frac{-1+2c}{c^2}\right] & h[1] & h[12] & h[14] & h[16] \\ t[1] & -\frac{-1+c+c^2}{c(-1+2c)} & -\frac{-1+3c-2c^2+c^3}{-1+2c} & \frac{-1+2c-c^2+c^3}{-1+2c} & 1 \\ t[13] & -\frac{1}{-1+2c} & \frac{(-1+c)^2}{-1+2c} & -\frac{(-1+c)^3}{c(-1+2c)} & 0 \\ t[15] & \frac{c}{-1+2c} & \frac{(-1+c)(-1+3c-2c^2+c^3)}{c(-1+2c)} & -\frac{(-1+c)(-1+2c-c^2+c^3)}{c(-1+2c)} & 0 \end{pmatrix}$$

$$\begin{pmatrix} W\left[-\frac{2-6c+5c^2-3c^3+c^4}{c^2}\right] & h[1] & h[14] & h[16] \\ t[1] & \frac{-2+4c-c^2+c^3}{c^2(2-6c+5c^2-3c^3+c^4)} & -\frac{-1+2c-c^2+c^3}{c(2-6c+5c^2-3c^3+c^4)} & -\frac{-1+2c}{c(2-6c+5c^2-3c^3+c^4)} \\ t[13] & -\frac{-2+2c-2c^2+c^3}{2-6c+5c^2-3c^3+c^4} & \frac{(-1+c)^3(2-c+c^2)}{c(2-6c+5c^2-3c^3+c^4)} & \frac{(-1+c)^3}{2-6c+5c^2-3c^3+c^4} \\ t[15] & -\frac{c}{2-6c+5c^2-3c^3+c^4} & \frac{(-1+c)(-1+2c-c^2+c^3)}{c(2-6c+5c^2-3c^3+c^4)} & \frac{(-1+c)^2(-1+3c-2c^2+c^3)}{c(2-6c+5c^2-3c^3+c^4)} \end{pmatrix}$$

$$\begin{pmatrix} W\left[-\frac{2-6c+5c^2-3c^3+c^4}{c^2}\right] & h[1] & h[14] & h[16] \\ t[1] & -\frac{2-4c-c^2+c^3-2c^4+c^5}{c^2(2-6c+5c^2-3c^3+c^4)} & \frac{-1+5c-9c^2+7c^3-4c^4+c^5}{c(2-6c+5c^2-3c^3+c^4)} & \frac{1-3c+3c^2-3c^3+c^4}{c(2-6c+5c^2-3c^3+c^4)} \\ t[15] & -\frac{c}{2-6c+5c^2-3c^3+c^4} & \frac{(-1+c)(-1+2c-c^2+c^3)}{c(2-6c+5c^2-3c^3+c^4)} & \frac{(-1+c)^2(-1+3c-2c^2+c^3)}{c(2-6c+5c^2-3c^3+c^4)} \end{pmatrix}$$

$$\begin{pmatrix} W\left[-\frac{1-4c+8c^2-11c^3+8c^4-4c^5+c^6}{c^3}\right] & h[1] & h[16] \\ t[1] & -\frac{1-3c+5c^2-8c^3+5c^4-3c^5+c^6}{c(1-4c+8c^2-11c^3+8c^4-4c^5+c^6)} & \frac{c(1-3c+3c^2-3c^3+c^4)}{1-4c+8c^2-11c^3+8c^4-4c^5+c^6} \\ t[15] & \frac{1-3c+3c^2-3c^3+c^4}{1-4c+8c^2-11c^3+8c^4-4c^5+c^6} & \frac{(-1+c)^4(1-c+c^2)}{1-4c+8c^2-11c^3+8c^4-4c^5+c^6} \end{pmatrix}$$

$$\begin{pmatrix} W\left[-\frac{1-4c+8c^2-11c^3+8c^4-4c^5+c^6}{c^3}\right] & h[1] & h[16] \\ t[1] & -\frac{1}{c} & 1 \end{pmatrix}$$

$$\begin{pmatrix} W\left[-\frac{1-4c+8c^2-11c^3+8c^4-4c^5+c^6}{c^2}\right] \end{pmatrix}$$