Pensieve header: Palindromicity by flipping and manipulating, in matrix language.

Programs

(Alt) In[ ]:=

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

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

```
Loading Rot.m from http://drorbn.net/APAI to compute rotation numbers.
```

(Alt) In[ ]:=

```
AlexanderMatrices[K_] := Module[{},
  {Cs, ρ} = Rot[K]; n = Length[Cs];
  ν = {lν = 0};
  For[k = 1, k ≤ 2 n, ++k,
   Cs /. {{s_, k, j_} :> AppendTo[ν, lν += s], {s_, i_, k} :> AppendTo[ν, lν -= s]}];
  ν = DiagonalMatrix[T^ν]; νi = Inverse@ν;
  A0 = Table[0, 2 n + 1, 2 n + 1]; A0[[2 n + 1, 2 n + 1]] = 1;
  C2 = C1 = Aπ = A1 = A2 = A3 = A4 = A0;
  P1 = RotateLeft[IdentityMatrix[2 n + 1]];
  (*P1=Table[0,2n+1,2n+1]; Do[P1[[i,i+1]]=1,{i,2n}];*)
  P2 = IdentityMatrix[2 n + 1]; Do[P2[[i, 1]] = -1, {i, 2, 2 n + 1}];
  E_{i_,j_} := ReplacePart[Table[0, 2 n + 1, 2 n + 1], {i, j} → 1];
  Cases[Cs, {s_Integer, i_, j_} :> (Aπ[[{i, j}, {i, j, i + 1, j + 1}]] = ({{1, 0, -1, 0}, {0, 1, T^s - 1, -T^s}});
     A0[[{i, j}, {i, j, i + 1, j + 1}]] = ({{1, 0, -T^s, T^s - 1}, {0, 1, 0, -1}});
     C1[[{i, j}, {i, j}]] = ({{-T^-s, T^-s - 1}, {0, -1}}); C2[[{i, j}, {i, j}]] = ({{-T^-s, 0}, {T^-s - 1, -1}});
     A1[[{i, j}, {i, j, i + 1, j + 1}]] = ({{-T^-s, T^-s - 1, 1, 0}, {0, -1, 0, 1}});
     A2[[{i, j, i + 1, j + 1}, {i, j}]] = ({{-T^-s, 0}, {T^-s - 1, -1}, {1, 0}, {0, 1}});
     A3[[{i, j}, {i, j, i + 1, j + 1}]] = ({{1, 0, -T^-s, 0}, {0, 1, T^-s - 1, -1}});
     A4[[{i, j}, {i, j, i + 1, j + 1}]] = ({{1, 0, -1, 0}, {0, 1, T^-s - 1, -T^-s}});)]; ]
AlexanderMatrices[Knot[10, 165]]
Det /@ {Aπ, A0, A1, A2, A3, A4}
Simplify[{C1.A0 == A1, (C1.A0)^T == A2, A0^T.C2.P1 + E_{1,1} == A3,
  νi.A0^T.C2.P1.ν + E_{1,1} == A4, νi.A0^T.C2.P1.ν.P2 == (Aπ /. T → T^-1)}]
```

KnotTheory: Loading precomputed data in PD4Knots`.

(Alt) Out[ ]=

$$\left\{\frac{-2T^3+10T^4-15T^5+10T^6-2T^7}{T}, \frac{-2T^2+10T^3-15T^4+10T^5-2T^6}{T^2}, -\frac{2T^2-10T^3+15T^4-10T^5+2T^6}{T^8}, -\frac{2T^9-10T^{10}+15T^{11}-10T^{12}+2T^{13}}{T^{15}}, \frac{-2T^9+10T^{10}-15T^{11}+10T^{12}-2T^{13}}{T^{15}}, \frac{-2T^2+10T^3-15T^4+10T^5-2T^6}{T^8}\right\}$$

(Alt) Out[ ]=

```
{True, True, False, False, True}
```

In[ ]:=

```
Total@Table[AlexanderMatrices[K];
  Simplify[νi.A0ᵀ.C2.P1.ν.P2 == (Aπ /. T → T^-1) ∧ (C2 /. T → T^-1) == Inverse[C2]],
  {K, AllKnots[{3, 10}]}]
```

Out[ ]=

```
249 True
```

In[∘]:=
```
AlexanderMatrices[Knot[3, 1]];
{lhs, rhs} = Simplify@{νi.A0ᵀ.C2.P1.ν.P2, Aπ /. T → T^-1};
MatrixForm /@ {C2, C2.P1, P1.ν.P2, Inverse[P1.ν.P2], ν, lhs, rhs}
Det /@ {lhs, rhs}
Simplify[lhs == rhs]
```

Out[∘]=

$$\left\{\begin{pmatrix} -1 & 0 & 0 & -1+T & 0 & 0 & 0 \\ 0 & -T & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & -1+T & 0 \\ 0 & 0 & 0 & -T & 0 & 0 & 0 \\ 0 & -1+T & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -T & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 & 0 & -1+T & 0 & 0 \\ 0 & 0 & -T & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & -1+T \\ 0 & 0 & 0 & 0 & -T & 0 & 0 \\ 0 & 0 & -1+T & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -T \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix},\right.$$

$$\begin{pmatrix} -T & T & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 1 & 0 & 0 & 0 & 0 \\ -T & 0 & 0 & T & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 1 & 0 & 0 \\ -T & 0 & 0 & 0 & 0 & T & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ \frac{1}{T} & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & \frac{1}{T} & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & \frac{1}{T} & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & T & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & T & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & T & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$\left.\begin{pmatrix} 1 & -T & 0 & 0 & -1+T & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -T & 0 & 0 & -1+T \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & -1+T & 0 & 1 & -T & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & -T & 0 & 0 & -1+T & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -T & 0 & 0 & -1+T \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & -1+T & 0 & 1 & -T & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}\right\}$$

Out[∘]=

$$\left\{1-T+T^2,\ 1-T+T^2\right\}$$

Out[∘]=

True

In[∘]:=
```
AlexanderMatrices[Knot[5, 2]];
{lhs, rhs} = Simplify@{νi.A0ᵀ.C2.P1.ν.P2, Aπ /. T → T^-1};
MatrixForm /@ {C2, Inverse[C2], ν, P1, P2, A0, Aπ}
Simplify[(C2 /. T → T^-1) == Inverse[C2]]
lhs == rhs
```

Out[∘]=

$$\left\{\begin{pmatrix} -1 & 0 & 0 & -1+T & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -T & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 & 0 & -1+T & 0 & 0 & 0 \\ 0 & 0 & 0 & -T & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & -1+T & 0 \\ 0 & 0 & 0 & 0 & 0 & -T & 0 & 0 & 0 & 0 & 0 \\ 0 & -1+T & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -T & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1+T & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -T & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},\right.$$

$$\begin{pmatrix} -1 & 0 & 0 & \frac{1-T}{T} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{T} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 & 0 & \frac{1-T}{T} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{T} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & \frac{1-T}{T} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{T} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1-T}{T} & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{T} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1-T}{T} & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{T} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & T & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & T & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & T & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & T & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & T & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$\begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$\begin{pmatrix} 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & -\frac{1}{T} & 0 & 0 & 0 & 0 & -1+\frac{1}{T} & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1+\frac{1}{T} & 0 & 1 & -\frac{1}{T} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & -\frac{1}{T} & 0 & 0 & -1+\frac{1}{T} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1+\frac{1}{T} & 0 & 0 & 0 & 1 & -\frac{1}{T} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1+\frac{1}{T} & 0 & 0 & 0 & 1 & -\frac{1}{T} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$\left(\begin{array}{ccccccccccc} 1 & -\frac{1}{T} & 0 & 0 & -1+\frac{1}{T} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -\frac{1}{T} & 0 & 0 & 0 & 0 & -1+\frac{1}{T} & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & -\frac{1}{T} & 0 & 0 & 0 & 0 & -1+\frac{1}{T} \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1+\frac{1}{T} & 0 & 0 & 0 & 1 & -\frac{1}{T} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1+\frac{1}{T} & 0 & 1 & -\frac{1}{T} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{array}\right)\Bigg\}$$

Out[ ]=

True

Out[ ]=

True

(Alt) In[ ]:=

$$\texttt{QF}[m\_?\texttt{MatrixQ}] := \texttt{Sum}[\texttt{Factor}[m[[i, j]]]\, x_i\, p_j, \{i, 2n+1\}, \{j, 2n+1\}]$$

(Alt) In[ ]:=

```
AlexanderMatrices[Mirror[Knot[3, 1]]]
```

(Alt) In[ ]:=

$$\texttt{Simplify}\left[\nu i.A0^{\mathsf{T}}.C2.P1.\nu.P2 == \left(A\pi \;/.\; T \to T^{-1}\right)\right]$$

(Alt) Out[ ]=

True

(Alt) In[ ]:=

$$\texttt{QF}[A0] == p_1 x_1 - T p_2 x_1 + (-1+T)\, p_5 x_1 + p_2 x_2 - p_3 x_2 + p_3 x_3 - T p_4 x_3 + (-1+T)\, p_7 x_3 + p_4 x_4 - p_5 x_4 + (-1+T)\, p_3 x_5 + p_5 x_5 - T p_6 x_5 + p_6 x_6 - p_7 x_6 + p_7 x_7$$

(Alt) Out[ ]=

True

(Alt) In[ ]:=

$$\texttt{QF}[C2^{\mathsf{T}}.A0]$$

(Alt) Out[ ]=

$$-\frac{p_1 x_1}{T} + p_2 x_1 - \frac{(-1+T)\, p_4 x_1}{T} - p_2 x_2 + p_3 x_2 - \frac{p_3 x_3}{T} + p_4 x_3 - \frac{(-1+T)\, p_6 x_3}{T} - p_4 x_4 + p_5 x_4 - \frac{(-1+T)\, p_2 x_5}{T} - \frac{p_5 x_5}{T} + p_6 x_5 - p_6 x_6 + p_7 x_6 + p_7 x_7$$

(Alt) In[ ]:=

$$\texttt{Simplify}\left[\texttt{QF}[C2^{\mathsf{T}}.A0] == -\frac{p_1 x_1}{T} + p_2 x_1 - \frac{(-1+T)\, p_4 x_1}{T} - p_2 x_2 + p_3 x_2 - \frac{p_3 x_3}{T} + p_4 x_3 - \frac{(-1+T)\, p_6 x_3}{T} - p_4 x_4 + p_5 x_4 - \frac{(-1+T)\, p_2 x_5}{T} - \frac{p_5 x_5}{T} + p_6 x_5 - p_6 x_6 + p_7 x_6 + p_7 x_7\right]$$

(Alt) Out[ ]=

True

(Alt) In[ ]:=

```
QF[A0ᵀ.C2]
```

(Alt) Out[ ]=

$$-\frac{p_1 x_1}{T}+p_1 x_2-p_2 x_2-\frac{(-1+T)\, p_5 x_2}{T}+p_2 x_3-\frac{p_3 x_3}{T}-\frac{(-1+T)\, p_1 x_4}{T}+ p_3 x_4-p_4 x_4+p_4 x_5-\frac{p_5 x_5}{T}-\frac{(-1+T)\, p_3 x_6}{T}+p_5 x_6-p_6 x_6+p_6 x_7+p_7 x_7$$

(Alt) In[ ]:=

$$\mathrm{QF}[A0^{T}.C2] == -\frac{p_1 x_1}{T}+p_1 x_2-p_2 x_2-\frac{(-1+T)\, p_5 x_2}{T}+p_2 x_3-\frac{p_3 x_3}{T}-\frac{(-1+T)\, p_1 x_4}{T}+p_3 x_4-p_4 x_4+p_4 x_5-\frac{p_5 x_5}{T}-\frac{(-1+T)\, p_3 x_6}{T}+p_5 x_6-p_6 x_6+p_6 x_7+p_7 x_7$$

(Alt) Out[ ]=

True

(Alt) In[ ]:=

```
QF[A0ᵀ.C2.P1]
```

(Alt) Out[ ]=

$$-\frac{p_2 x_1}{T}+p_2 x_2-p_3 x_2-\frac{(-1+T)\, p_6 x_2}{T}+p_3 x_3-\frac{p_4 x_3}{T}-\frac{(-1+T)\, p_2 x_4}{T}+ p_4 x_4-p_5 x_4+p_5 x_5-\frac{p_6 x_5}{T}-\frac{(-1+T)\, p_4 x_6}{T}+p_6 x_6-p_7 x_6+p_1 x_7+p_7 x_7$$

(Alt) In[ ]:=

$$\mathrm{QF}[A0^{T}.C2.P1] == -\frac{p_2 x_1}{T}+p_2 x_2-p_3 x_2-\frac{(-1+T)\, p_6 x_2}{T}+p_3 x_3-\frac{p_4 x_3}{T}-\frac{(-1+T)\, p_2 x_4}{T}+p_4 x_4-p_5 x_4+p_5 x_5-\frac{p_6 x_5}{T}-\frac{(-1+T)\, p_4 x_6}{T}+p_6 x_6-p_7 x_6+p_1 x_7+p_7 x_7$$

(Alt) Out[ ]=

True

(Alt) In[ ]:=

```
νi.A0ᵀ.C2.P1.ν // QF
```

(Alt) Out[ ]=

$$-p_2 x_1+p_2 x_2-\frac{p_3 x_2}{T}-\frac{(-1+T)\, p_6 x_2}{T}+p_3 x_3-p_4 x_3-\frac{(-1+T)\, p_2 x_4}{T}+ p_4 x_4-\frac{p_5 x_4}{T}+p_5 x_5-p_6 x_5-\frac{(-1+T)\, p_4 x_6}{T}+p_6 x_6-\frac{p_7 x_6}{T}+p_1 x_7+p_7 x_7$$

(Alt) In[ ]:=

$$\mathrm{QF}[\nu i.A0^{T}.C2.P1.\nu] == -p_2 x_1+p_2 x_2-\frac{p_3 x_2}{T}-\frac{(-1+T)\, p_6 x_2}{T}+p_3 x_3-p_4 x_3-\frac{(-1+T)\, p_2 x_4}{T}+p_4 x_4-\frac{p_5 x_4}{T}+p_5 x_5-p_6 x_5-\frac{(-1+T)\, p_4 x_6}{T}+p_6 x_6-\frac{p_7 x_6}{T}+p_1 x_7+p_7 x_7$$

(Alt) Out[ ]=

True

(Alt) In[]:=

```
QF[νi.A0ᵀ.C2.P1.ν.P2]
```

(Alt) Out[]=

$$p_1 x_1 - p_2 x_1 + p_2 x_2 - \frac{p_3 x_2}{T} - \frac{(-1+T)\, p_6 x_2}{T} + p_3 x_3 - p_4 x_3 - \frac{(-1+T)\, p_2 x_4}{T} + p_4 x_4 - \frac{p_5 x_4}{T} + p_5 x_5 - p_6 x_5 - \frac{(-1+T)\, p_4 x_6}{T} + p_6 x_6 - \frac{p_7 x_6}{T} + p_7 x_7$$

(Alt) In[]:=

```
QF[νi.A0ᵀ.C2.P1.ν.P2] ==
```

$$p_1 x_1 - p_2 x_1 + p_2 x_2 - \frac{p_3 x_2}{T} - \frac{(-1+T)\, p_6 x_2}{T} + p_3 x_3 - p_4 x_3 - \frac{(-1+T)\, p_2 x_4}{T} + p_4 x_4 - \frac{p_5 x_4}{T} + p_5 x_5 - p_6 x_5 - \frac{(-1+T)\, p_4 x_6}{T} + p_6 x_6 - \frac{p_7 x_6}{T} + p_7 x_7$$

(Alt) Out[]=

True