

Pensieve header: The top row of \$G\$ isn't friendly.

```
In[*]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\APAI"];
```

```
In[*]:= 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.

```
In[*]:= R1[s_, i_, j_] := s (g_{j,i} (g_{j^*,j} + g_{j,j^*} - g_{i,j}) - g_{i,i} (g_{j,j^*} - 1) - 1 / 2);
rho[K_] := Module[{Cs, phi, n, A, s, i, j, k, Delta, G, rho1},
  {Cs, phi} = Rot[K]; n = Length[Cs];
  A = IdentityMatrix[2 n + 1];
  Cases[Cs, {s_, i_, j_} -> (A[[{i, j}, {i + 1, j + 1}]] += ( -T^s T^s - 1 ))];
  Delta = T^(-Total[phi] - Total[Cs[[All, 1]]) / 2) Det[A];
  G = Inverse[A]; Echo[MatrixForm@G];
  rho1 = Sum_{k=1}^n R1 @@ Cs[[k]] - Sum_{k=1}^{2^n} phi[[k]] (g_{kk} - 1 / 2);
  Factor@{Delta, Delta^2 rho1 /. alpha_ -> alpha + 1 /. g_{alpha,beta} -> G[[alpha, beta]]};
```

```
In[*]:= delta_{i,j} := If[i === j, 1, 0];
gRules_{s_,i_,j_} := {g_{i,beta} -> delta_{i,beta} + T^s g_{i^*,beta} + (1 - T^s) g_{j^*,beta}, g_{j,beta} -> delta_{j,beta} + g_{j^*,beta},
  g_{alpha,i} -> T^{-s} (g_{alpha,i^*} - delta_{alpha,i^*}), g_{alpha,j} -> g_{alpha,j^*} - (1 - T^s) g_{alpha,i} - delta_{alpha,j^*}}
(alpha_ -> alpha)^+ := alpha^{++}; (* this is for cosmetic reasons only *)
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```
In[*]:= rho@Knot[4, 1]
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$$\gg \begin{pmatrix} 1 & \frac{T-3T^2+T^3}{1-3T+T^2} & \frac{T(T-3T^2+T^3)}{1-3T+T^2} & \frac{T-3T^2+T^3}{1-3T+T^2} & 1 & \frac{T-3T^2+T^3}{1-3T+T^2} & \frac{T(T-3T^2+T^3)}{1-3T+T^2} & \frac{T-3T^2+T^3}{1-3T+T^2} & 1 \\ 0 & 1 & -\frac{T^2}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & \frac{(1-2T)T}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & 1 \\ 0 & 0 & -\frac{T^2}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & \frac{(1-2T)T}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & 1 \\ 0 & 0 & \frac{T(T-T^2)}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & \frac{T-2T^2}{1-3T+T^2} & -\frac{T^3}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & 1 \\ 0 & 0 & \frac{T(T-T^2)}{1-3T+T^2} & \frac{T-T^2}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & \frac{T-2T^2}{1-3T+T^2} & -\frac{T^3}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & 1 \\ 0 & 0 & \frac{(1-T)T}{1-3T+T^2} & \frac{1-T}{1-3T+T^2} & \frac{1-T}{1-3T+T^2} & \frac{1-2T}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & 1 \\ 0 & 0 & \frac{(1-T)T}{1-3T+T^2} & \frac{1-T}{1-3T+T^2} & \frac{1-T}{1-3T+T^2} & \frac{T-T^2}{1-3T+T^2} & -\frac{T^2}{1-3T+T^2} & -\frac{T}{1-3T+T^2} & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

```
Out[*]= { -\frac{1-3T+T^2}{T}, 0 }
```