

Run

```
(Alt) In[ ]:=
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\Discovery-2024"];
nb2tex["MathematicaInserts", PDFWidth -> 4.2];
```

Inserts

```
(Alt) In[ ]:=
```

```
<< KnotTheory`
```

```
C:\\drorbn\\AcademicPensieve\\Projects\\KnotTheory\\KnotTheory
```

```
Loading KnotTheory` version of September 27, 2024, 13:23:33.5336.
```

```
Read more at http://katlas.org/wiki/KnotTheory.
```

```
(Alt) In[ ]:=
```

```
Rot[pd_PD] := Module[{n, xs, x, rots, Xp, Xm, 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];
    ]
  ];
  {xs /. {Xp[i_, j_] => {+1, i, j}, Xm[i_, j_] => {-1, i, j}}, rots }];
Rot[K_] := Rot[PD[K]];
```

```
(Alt) In[ ]:=
pdf:R1
```

$$R_{11}[s_, i_, j_] =$$

$$s \left(\frac{1}{2} - g_{3ii} + T_2^5 g_{1ii} g_{2ji} - g_{1ii} g_{2jj} - (T_2^5 - 1) g_{2ji} g_{3ii} + 2 g_{2jj} g_{3ii} - (1 - T_3^5) g_{2ji} g_{3ji} - \right.$$

$$g_{2ii} g_{3jj} - T_2^5 g_{2ji} g_{3jj} + g_{1ii} g_{3jj} + \left((T_1^5 - 1) g_{1ji} (T_2^{2^5} g_{2ji} - T_2^5 g_{2jj} + T_2^5 g_{3jj}) + \right.$$

$$\left. (T_3^5 - 1) g_{3ji} (1 - T_2^5 g_{1ii} - (T_1^5 - 1) (T_2^5 + 1) g_{1ji} + (T_2^5 - 2) g_{2jj} + g_{2ij}) \right) / (T_2^5 - 1);$$

```
(Alt) In[ ]:=
pdf:theta
```

$$R_{12}[\{s0_, i0_, j0_}, \{s1_, i1_, j1_}] = s1 (T_1^{s0} - 1) (T_2^{s1} - 1)^{-1}$$

$$(T_3^{s1} - 1) g_{1,j1,i0} g_{3,j0,i1} \left((T_2^{s0} g_{2,i1,i0} - g_{2,i1,j0}) - (T_2^{s0} g_{2,j1,i0} - g_{2,j1,j0}) \right);$$

(Alt) In[]:=
pdf:Gamma1

$$\Gamma_1[\varphi, k] = -\varphi / 2 + \varphi \mathfrak{G}_{3kk};$$

(Alt) In[]:=
pdf:Program

```

T3 = T1 T2;
Θ[K_] := Module[{Cs, φ, n, A, s, i, j, k, Δ, G, v, α, β, gEval, c, z},
  {Cs, φ} = Rot[K]; n = Length[Cs];
  A = IdentityMatrix[2 n + 1];
  Cases[Cs, {s_, i_, j_} >> (A[[{i, j}, {i + 1, j + 1}]] += (

$$\begin{pmatrix} -T^s & T^s - 1 \\ 0 & -1 \end{pmatrix})];
  Δ = T^{(-Total[φ] - Total[Cs[[All, 1]])] / 2} Det[A];
  G = Inverse[A];
  gEval[ε_] := Factor[ε /. g_{v, α, β} >> (G[[α, β]] /. T → T_v)];
  z = gEval[Sum_{k=1}^n R_{11} @@ Cs[[k]]];
  z += gEval[Sum_{k1=1}^n Sum_{k2=1}^n R_{12}[Cs[[k1]], Cs[[k2]]]];
  z += gEval[Sum_{k=1}^{2^n} Γ_1[φ[[k]], k]];
  {Δ, (Δ /. T → T_1) (Δ /. T → T_2) (Δ /. T → T_3) z} // Factor];$$

```

(Alt) In[]:=

Θ[Knot[3, 1]] // Expand

 KnotTheory: Loading precomputed data in PD4Knots`.

(Alt) Out[]:=

$$\left\{ -1 + \frac{1}{T} + T, -\frac{1}{T_1^2} - T_1^2 - \frac{1}{T_2^2} - \frac{1}{T_1^2 T_2^2} + \frac{1}{T_1 T_2^2} + \frac{1}{T_1^2 T_2} + \frac{T_1}{T_2} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}$$

nb2tex

As in <http://drorbn.net/AcademicPensieve/Projects/nb2tex/>.

(Alt) In[]:=

```

SetOptions[$FrontEndSession, PrintingStyleEnvironment -> "Working"];
nb2tex[nb_String, opts___Rule] := nb2tex[nb, nb, opts];

```

(Alt) In[]:=

```

nb2tex[nb_String, tex_String, opts___Rule] := Module[
  {notebook, PDFCounter = 0, type,
   tag, pdfname, cells, cell, c, cl, texfiles = {}, TeXOut,
   PDFFolder = PDFFolder /. {opts} /. PDFFolder → nb
  },
  nb2tex$TeXFileName = tex <> ".tex";
  nb2tex$PDFWidth = PDFWidth /. {opts} /. PDFWidth → 6.5;
  TeXOut[s_String] := (texfiles = texfiles ∪ {nb2tex$TeXFileName};
   WriteString[nb2tex$TeXFileName, s]);
  notebook = NotebookGet[NotebookOpen@FileNameJoin[{Directory[], nb <> ".nb"}]];
  If[FileType[PDFFolder] === None, CreateDirectory[PDFFolder]];
  DeleteFile /@ FileNames["*.pdf", PDFFolder];
  cells = Cases[notebook, c_Cell /; Length[c] ≥ 2, ∞];
  Do[
    type = cell[[2]];
    tag = CellTags /. Cases[cell, _Rule] /. CellTags → "";
    Which[
      type == "Text" ^ tag == "tex", TeXOut[
        StringReplace[cell[[1]], {"'" → "'", "\"" → "\""}] <> "\n\n",
        StringMatchQ[tag, "pdf:" ~~ ___], (
          pdfname = PDFFolder <> "/" <> StringDrop[tag, 4] <> type <> ".pdf";
          Export[pdfname, Join[cell, Cell[PageWidth → 80 nb2tex$PDFWidth / 0.75]]];
          cl = "c:\\drorbn\\bin\\cpdf.exe -scale-page \"0.75 0.75\" " <>
            pdfname <> " -o " <> pdfname;
          Close@OpenRead["!" <> cl];
        ),
      StringMatchQ[tag, "pdf" ~~ ___], (
          pdfname = PDFFolder <> "/" <> ToString[++PDFCounter] <> ".pdf";
          Export[pdfname, Join[cell, Cell[PageWidth → 80 nb2tex$PDFWidth / 0.75]]];
          cl = "c:\\drorbn\\bin\\cpdf.exe -scale-page \"0.75 0.75\" " <>
            pdfname <> " -o " <> pdfname;
          Close@OpenRead["!" <> cl];
          TeXOut[StringReplace[
            "\\noindent\\nbpdfXXXType{pdfname}\\n\n",
            {"XXX" → StringDrop[tag, 3], "Type" → type, "pdfname" → pdfname}
          ]]
        ),
      type == "Input" ^ tag == "exec", ToExpression[cell[[1]],
        True, Null
      ],
    {cell, cells}
  ];
  Close /@ texfiles;
]

```