Pensieve header: RVK and Z. Continues pensieve://Projects/SL2Portfolio2/.

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RVK and Z

RVK, rot, Z from 2016-09/OneSmidgen.nb. See also in AP/Projects/SL2Invariant/.

Some details of the code below are at http://drorbn.net/bbs/show?shot=Dror-160920-151350.jpg.

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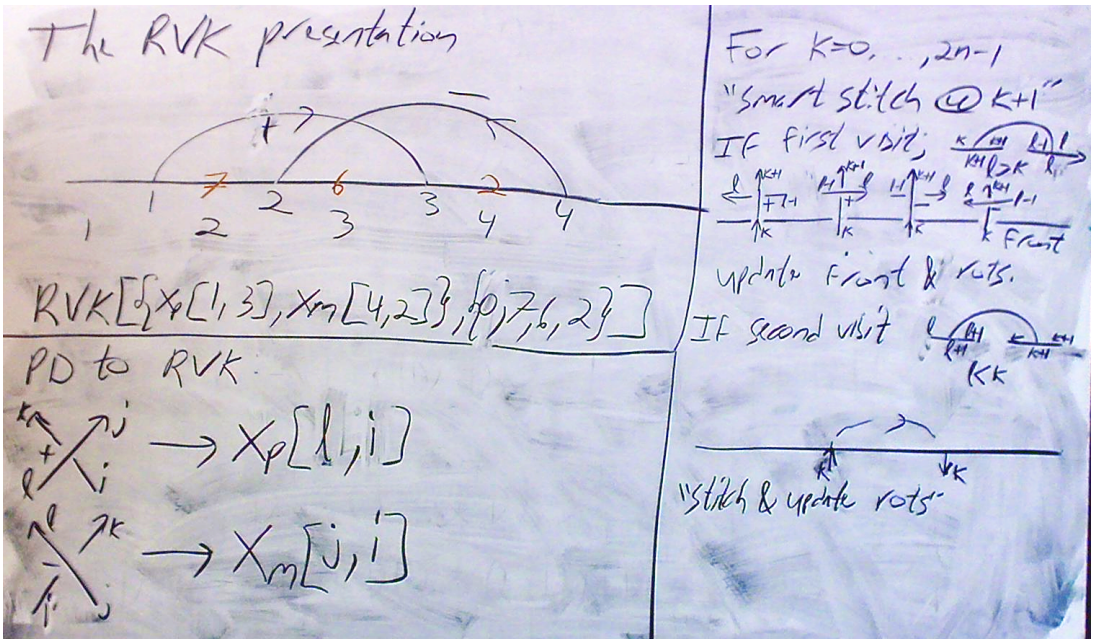

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In[•]:=

```
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.";
```

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```
RVK[pd_PD] := PP_RVK@Module[{n, xs, x, rots, front = {0}, 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 = 0, k < 2 n, ++k, If[k == 0 ∨ FreeQ[front, -k],
      front = Flatten@Replace[front, k → (xs /. {
              Xp[k + 1, l_] | Xm[l_, k + 1] :> {l, k + 1, 1 - l},
              Xp[l_, k + 1] | Xm[k + 1, l_] :> (++rots[[l]];
                {1 - l, k + 1, l}),
              _Xp | _Xm :> {}
             }), {1}],
      Cases[front, k | -k] /. {k, -k} :> --rots[[k + 1]];
     ]];
    RVK[xs, rots] ];
RVK[K_] := RVK[PD[K]];
```

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```
rot[i_, 0] := dη_i;
rot[i_, n_] := rot[i, n, $k];
rot[i_, n_, k_] := Module[{j},
   rot[i, n, k] = If[n > 0, rot[i, n - 1] kC_j, rot[i, n + 1] \[OverBar]kC_j] // km_{i,j→i}];
```

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In[•]:=

```
Width[pd_PD] :=
 Max[Length /@ FoldList[Complement[#1 ⋃ #2, #1 ⋂ #2] &, {}, List @@ List @@@ pd]]
```

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```
ThinPosition[K_] := Module[{todo, done, pd, c},
   todo = List @@ PD@K; done = {}; pd = PD[];
   While[todo =!= {},
    AppendTo[pd, c = RandomChoice@MaximalBy[todo, Length[done ⋂ List @@ #] &]];
    todo = DeleteCases[todo, c];
    done = done ⋃ List @@ c];
   pd ];
ThinPosition[K_, n_] := First@MinimalBy[Table[ThinPosition[K], n], Width];
```

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```
Z[K_] := Z[RVK@EchoFunction[Width]@ThinPosition[K, 100]];
Z[rvk_RVK] := Monitor[ PP"z"@Module[{ξ, done, st, c, χ, i, j, k},
    ξ = 1; done = {}; st = Range[2 Length[rvk[[1]]]]; $M = {};
    Do[AppendTo[$M, c];
     {i, j} = List @@ c;
     χ = (c /. {_Xp :> kR_{i,j} kKink0, _Xm :> kR_{i,j} kKink0}) // km_{j,0→j};
     Do[χ = (rot[0, rvk[[2, k]]] χ) // km_{0,k→k}, {k, {i, j}}];
     ξ *= χ;
     Do[
      If[MemberQ[done, k + 1], ξ = ξ // km_{k,k+1→k}; st = st /. k + 1 → k];
      If[MemberQ[done, k - 1], ξ = ξ // km_{st[[k-1]],k→st[[k-1]]}; st = st /. k → st[[k - 1]]],
      {k, {i, j}}];
     done = done ⋃ {i, j},
     {c, rvk[[1]]}
    ];
    CF /@ (ξ /. {x1 → x, y1 → y, a1 → a})
   ], {Length@$M, $M}]
```