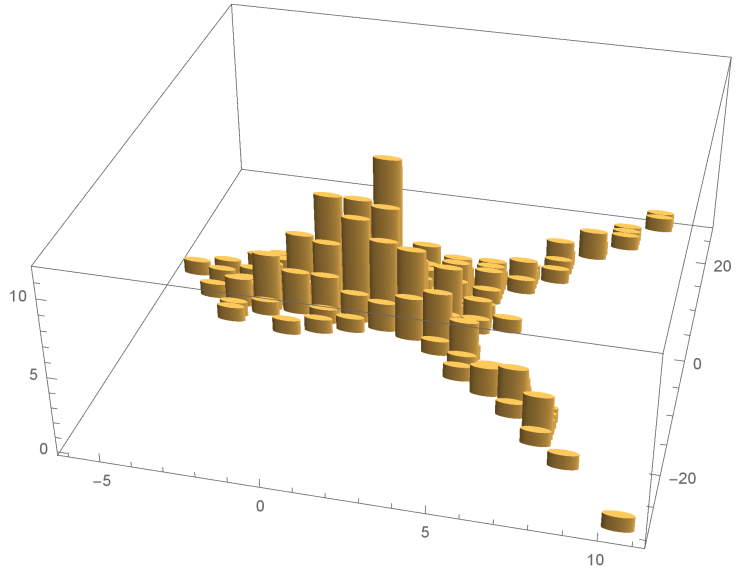


```
<< KnotTheory`
Loading KnotTheory` version
of September 6, 2014, 13:37:37.2841.
Read more at http://katlas.org/wiki/KnotTheory.
```

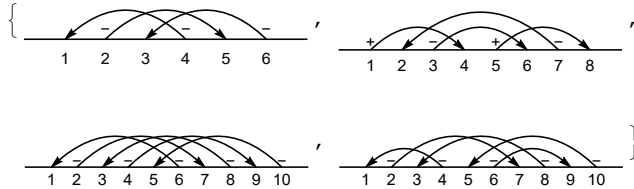
```
Table[K → V3[K], {K, AllKnots@{3, 7}}]
{31 → -1, 41 → 0, 51 → -5, 52 → -3, 61 → 1, 62 → 1, 63 → 0,
71 → -14, 72 → -6, 73 → 11, 74 → 8, 75 → -8, 76 → -2, 77 → -1}
```

```
GD[g_GD] := g;
GD[L_] := GD@@PD[L] /.
X[i_, j_, k_, l_] => If[PositiveQ@X[i, j, k, l],
Api,i, Amj,i];
Draw[g_GD] := Module[{n = Max@Cases[g, _Integer, ∞]},
Graphics[{
Line[{{0, 0}, {n+1, 0}}],
List@@g /. (ah_)i,j => {
Arrow[BezierCurve[{{i, 0}, {i+j, Abs[j-i]}/2,
{j, 0}}]],
Text[ah /. {Ap → "+", Am → "-"}, {i, 0.3}]},
Table[Text[i, {i, -0.5}], {i, n}]]]
```

```
Histogram3D[
Table[{V2[K], V3[K]}, {K, AllKnots@{3, 10}}],
{1}]
```



```
Draw /@ GD /@ AllKnots@{3, 5}
KnotTheory::loading: Loading precomputed data in PD4Knots`.
```



```
GD /@ AllKnots@{3, 5}
{GD[Am4,1, Am6,3, Am2,5], GD[Ap1,4, Ap5,8, Am3,6, Am7,2],
GD[Am6,1, Am8,3, Am10,5, Am2,7, Am4,9],
GD[Am4,1, Am8,3, Am10,5, Am6,9, Am2,7]}
```

```
G[λ]a,b := ∂ta,hbλ;
G /: Factor[G[λ]] :=
G[Collect[λ, h_, Collect[#, t_, Factor] &]];
Format@G_ := Module[{S = Union@Cases[γ, (h | t)a => a, ∞]},
Table[γa,b, {a, S}, {b, S}] // MatrixForm];
```

```
CF[g_GD] := Sort[
g /. Thread[Sort@Cases[g, _Integer, ∞] →
Range[2 Length[g]]];
PV[F_GD, g_GD] /: Length[F] > Length[g] := 0;
PV[F_GD, g_GD] /: Length[F] < Length[g] := Sum[
PV[F, y], {y, Subsets[g, {Length[F]}]}];
PV[F_GD, g_GD] /: Length[F] == Length[g] := If[
CF[F] == CF[g /. Ap | Am → A], (-1)Count[g, Am_], 0];
V2[g_] := V2[g] = PV[GD[A3,1, A2,4], GD[g]];
```

```
G /: G[λ1] G[λ2] := G[λ1 + λ2];
ma,b → c[G[λ]] := Module[{α, β, γ, δ, θ, ε, φ, ψ, Ξ, μ},

$$\begin{pmatrix} \alpha & \beta & \theta \\ \gamma & \delta & \epsilon \\ \phi & \psi & \Xi \end{pmatrix} = \begin{pmatrix} \partial_{t_a, h_a} \lambda & \partial_{t_a, h_b} \lambda & \partial_{t_a} \lambda \\ \partial_{t_b, h_a} \lambda & \partial_{t_b, h_b} \lambda & \partial_{t_b} \lambda \\ \partial_{h_a} \lambda & \partial_{h_b} \lambda & \lambda \end{pmatrix} / . (t | h)a|b → 0;$$

μ = 1 - β;
G[Tr[ $\begin{pmatrix} t_c \\ 1 \end{pmatrix}^T \cdot (\gamma + \alpha \delta / \mu \epsilon + \delta \theta / \mu) \cdot \begin{pmatrix} h_c \\ 1 \end{pmatrix}$ ]] / . Ta|b → Tc //
Factor];
Rpa,b := G[Tr[ $\begin{pmatrix} t_a \\ t_b \end{pmatrix}^T \cdot \begin{pmatrix} 1 & 1 - T_a \\ 0 & T_a \end{pmatrix} \cdot \begin{pmatrix} h_a \\ h_b \end{pmatrix}$ ]];
Rma,b := Rpa,b / . Ta → 1 / Ta;
```

```
Format[Knot[n_, k_]] := nk;
Table[K → V2[K], {K, AllKnots@{3, 7}}]
{31 → 1, 41 → -1, 51 → 3, 52 → 2, 61 → -2, 62 → -1, 63 → 1,
71 → 6, 72 → 3, 73 → 5, 74 → 4, 75 → 4, 76 → 1, 77 → -1}
```

```
GG[g_GD, k_, F_, BB_] :=
Module[{n = 2 Length@g + Length@BB, y, cuts, rr, γ0, γ},
γ0 = G[tn+1 hn+1] Times @@ g /. {Ap → Rp, Am → Rm};
γ0 *= G[Sum[βa,b ta hb, {a, BB}, {b, BB}]];
Sum[γ = γ0;
cuts = Cases[y, _Integer, ∞] ∪ {n+1};
rr = Thread[cuts → Range[Length@cuts]];
Do[If[! MemberQ[cuts, j], γ = γ / mj, j+1 → j+1], {j, n}];
F[y /. rr, γ /. (v_)a => va/.rr],
(*over*) {y, Subsets[List@@g, k]}];
GG[g_GD, k_, F_] := GG[g, k, F, {}];
```

```
PV[F1_ + F2_, g_] := PV[F1, g] + PV[F2, g];
PV[c_*F_GD, g_] := c PV[F, g];
ρk[g_] := g /. i_Integer => Mod[i - k, 2 Length@g, 1];
F3 =  $\sum_{k=0}^5 (3 \rho_k @ GD[A_{1,5}, A_{4,2}, A_{6,3}] + 2 \rho_k @ GD[A_{1,4}, A_{5,2}, A_{3,6}])$ ;
V3[K_] := V3[K] = PV[F3, GD@K] / 6;
```