```
<< KnotTheory`
```

```
Loading KnotTheory` version of January 18, 2008, 18:17:28.7446.
Read more at http://katlas.org/wiki/KnotTheory.
```

```
wAlex[K_] := {
  pd = PD[K],
  gc = List @@ pd /. X[i_, j_, k_, l_] :> If[PositiveQ[X[i, j, k, l]],
      Ar[l, i, +1], Ar[j, i, -1]
     ],
  Aij[Ar[ti_, hi_, si_], Ar[tj_, hj_, sj_]] := If[
    ti < hj < hi || hi < hj < ti,
    X^(si * Sign[hi - ti]) - 1,
    0
   ];
  MatrixForm[A = Outer[Aij, gc, gc]],
  Tr[Inverse[
       IdentityMatrix[Length[A]] - A
      ]] - Length[A] // Together // ExpandNumerator
 }
```

```
wAlex[BR[2, {1, 1, 1}]]
```

{PD[X[3, 1, 4, 6], X[1, 5, 2, 4], X[5, 3, 6, 2]],

{Ar[6, 3, 1], Ar[4, 1, 1], Ar[2, 5, 1]}, $\begin{pmatrix} 0 & 0 & -1+\frac{1}{X} \\ -1+\frac{1}{X} & 0 & 0 \\ -1+X & 0 & 0 \end{pmatrix}$, $\frac{-2+4X-2X^2}{1-X+X^2}$}

```
wAlex[BR[3, {1, 2, 1, 2}]]
```

{PD[X[8, 6, 1, 5], X[3, 7, 4, 6], X[4, 2, 5, 1], X[7, 3, 8, 2]],

{Ar[5, 8, 1], Ar[6, 3, 1], Ar[1, 4, 1], Ar[2, 7, 1]}, $\begin{pmatrix} 0 & 0 & 0 & -1+X \\ 0 & 0 & -1+\frac{1}{X} & 0 \\ 0 & -1+X & 0 & 0 \\ 0 & -1+X & -1+X & 0 \end{pmatrix}$, $\frac{-2+4X-2X^2}{1-X+X^2}$}

```
wAlex[BR[3, {1, 2, 1, 1, -1, 2}]]
```

{PD[X[5, 3, 6, 2], X[10, 4, 11, 3], X[11, 7, 12, 6], X[7, 1, 8, 12], X[8, 1, 9, 2], X[4, 10, 5, 9]],
{Ar[2, 5, 1], Ar[3, 10, 1], Ar[6, 11, 1], Ar[12, 7, 1], Ar[1, 8, -1], Ar[9, 4, 1]},

$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -1+X \\ -1+X & 0 & 0 & -1+X & -1+X & -1+X \\ 0 & -1+X & 0 & -1+X & -1+X & 0 \\ 0 & -1+\frac{1}{X} & -1+\frac{1}{X} & 0 & -1+\frac{1}{X} & 0 \\ -1+\frac{1}{X} & 0 & 0 & -1+\frac{1}{X} & 0 & -1+\frac{1}{X} \\ -1+\frac{1}{X} & 0 & 0 & -1+\frac{1}{X} & -1+\frac{1}{X} & 0 \end{pmatrix}$, $\frac{-1+3X-6X^2+8X^3-5X^4+X^5}{X^2\left(1-X+X^2\right)}$}

$$\text{Factor}\left[\frac{-2+4X-2X^2}{1-X+X^2}+\left(\frac{-2+4X-2X^2}{1-X+X^2}\ /.\ X\to 1/X\right)\right]$$

$$-\frac{4\,(-1+X)^2}{1-X+X^2}$$

$$\text{Factor}\left[\frac{-1+3X-6X^2+8X^3-5X^4+X^5}{X^2\left(1-X+X^2\right)}+\left(\frac{-1+3X-6X^2+8X^3-5X^4+X^5}{X^2\left(1-X+X^2\right)}\ /.\ X\to 1/X\right)\right]$$

$$-\frac{(-1+X)^2\left(1-2X+6X^2-2X^3+X^4\right)}{X^2\left(1-X+X^2\right)}$$