

Pensieve header: Computing linking matrices.

```
In[ ]:= << KnotTheory`
```

```
Loading KnotTheory` version of February 2, 2020, 10:53:45.2097.
Read more at http://katlas.org/wiki/KnotTheory.
```

```
In[ ]:= L = Link["L9a1"]
```

```
Out[ ]:= Link[9, Alternating, 1]
```

```
In[ ]:= Skeleton[L]
```

```
KnotTheory: Loading precomputed data in PD4Links`.
```

```
Out[ ]:= {Loop[1, 2, 3, 4], Loop[5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18]}
```

```
LM[L_] := Module[{skel = Skeleton[L], lm},
  lm = Table[0, {Length@skel}, {Length@skel}];
  (x ↦ (lm[[Position[skel, x[[1]]][[1, 1]], Position[skel, x[[2]]][[1, 1]]] +=
    If[PositiveQ[x], 1, -1])) /@ PD[L];
  lm
]
```

```
In[ ]:= LM[L] // MatrixForm
```

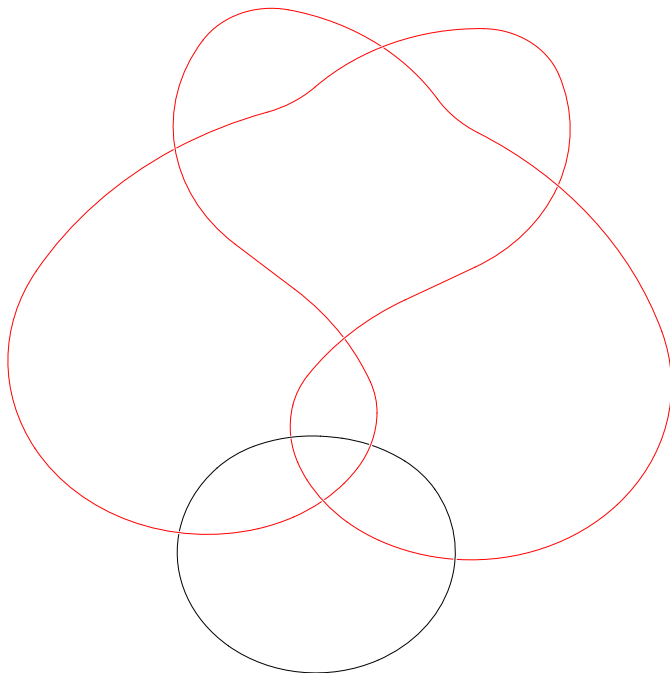
```
Out[ ]//MatrixForm=
```

$$\begin{pmatrix} 0 & 0 \\ 0 & 3 \end{pmatrix}$$

```
In[ ]:= DrawPD@L
```

```
KnotTheory: DrawPD was written by Emily Redelmeier at the University of Toronto in the summers of 2003 and 2004.
```

```
Out[ ]:=
```



In[*]:= MatrixForm@LM@# & /@AllLinks[9, Alternating]

$$\text{Out[*]} = \left\{ \begin{array}{l}
 \begin{pmatrix} 0 & 0 \\ 0 & 3 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 3 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 3 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 5 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & 5 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -5 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -5 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}, \\
 \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -5 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -5 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 5 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 5 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 5 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 5 \end{pmatrix}, \\
 \begin{pmatrix} 0 & -2 \\ -2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & -1 \end{pmatrix}, \begin{pmatrix} 0 & -3 \\ -3 & 3 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & -3 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & -3 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ 1 & 3 \end{pmatrix}, \\
 \begin{pmatrix} 0 & 1 \\ 1 & -1 \end{pmatrix}, \begin{pmatrix} 0 & -3 \\ -3 & 3 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & -3 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & -3 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ 1 & -3 \end{pmatrix}, \begin{pmatrix} 0 & -3 \\ -3 & -3 \end{pmatrix}, \begin{pmatrix} 0 & -3 \\ -3 & 3 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & -1 \end{pmatrix}, \\
 \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 2 \\ 2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 2 \\ 2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & -2 \\ -2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & -1 \\ -1 & -1 & -3 \end{pmatrix}, \\
 \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 1 \\ -1 & 1 & 3 \end{pmatrix}, \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 1 \\ -1 & 1 & 3 \end{pmatrix}, \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 0 \\ -1 & 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 2 \\ -1 & 2 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & -1 \\ -1 & 0 & 2 \\ -1 & 2 & 1 \end{pmatrix}, \\
 \begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 0 \\ 1 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 1 \\ -1 & 0 & 2 \\ 1 & 2 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 0 & -2 \\ 0 & -1 & 0 \\ -2 & 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \left. \begin{pmatrix} 0 & -1 & -1 & 0 \\ -1 & 0 & 0 & -1 \\ -1 & 0 & 0 & 1 \\ 0 & -1 & 1 & 1 \end{pmatrix} \right\}
 \end{array} \right.$$