

```
In[ ]:= Clear[λ];
      K = Knot[8, 2]
Out[ ]:= Knot[8, 2]
```

```
In[ ]:= soup = Times @@ PD[K] /. x : X[i_, j_, k_, L_] => If[PositiveQ[x],
      aj,i[i] ak,-j[j] a-L,-k[k] a-i,L[L],
      a-j,i[i] ak,j[j] aL,-k[k] a-i,-L[L]
    ]
```

```
Out[ ]:= a-16,9[9] a-15,-9[9] a-14,7[7] a-13,-7[7] a-12,5[5] a-11,2[2] a-10,-4[4] a-9,-1[1]
      a-8,15[15] a-7,-15[15] a-6,13[13] a-5,-13[13] a-4,1[1] a-3,10[10] a-2,-12[12]
      a-1,-5[5] a1,-10[10] a2,4[4] a3,11[11] a4,-11[11] a5,-2[2] a6,12[12] a7,-14[14]
      a8,14[14] a9,-16[16] a10,16[16] a11,3[3] a12,-3[3] a13,-6[6] a14,6[6] a15,-8[8] a16,8[8]
```

```
In[ ]:= cs = soup /. ai,j[x__] aj,k[y__] => ai,k[x, y] /. a__[x__] => a[x]
```

```
Out[ ]:= a[7, 14] a[9, 16] a[11, 3] a[13, 6] a[15, 8] a[2, 4, 11]
      a[4, 1, 10] a[12, 5, 2] a[13, 7, 15, 9, 1, 5] a[14, 6, 12, 3, 10, 16, 8]
```

```
In[ ]:= A = Table[0, Length@cs, Length@cs]
```

```
Out[ ]:= {{0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
      {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
      {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
      {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}}
```

```
In[ ]:= t = 1 - λ2; r = t + t*;
```

```
In[ ]:= {t, r}
```

```
Out[ ]:= {1 - λ2, 2 - λ2 - Conjugate[λ]2}
```

```
In[ ]:= Do[Echo[x];
      is = Position[cs, x[[]]] [[1, 1]] & /@ {1, 2, 3, 4};
      Echo[is];
      A[[is, is]] += If[PositiveQ[x],
```

$$\begin{pmatrix} 0 & t^* & 0 & -t^* \\ t & -r & -t^* & 2t^* \\ 0 & -t & 0 & t \\ -t & 2t & t^* & -r \end{pmatrix}, \begin{pmatrix} r & -t & -2t^* & t^* \\ -t^* & 0 & t^* & 0 \\ -2t & t & r & -t^* \\ t & 0 & -t & 0 \end{pmatrix}$$

```
],
{x, List @@ PD[K]} ]
```

- » X[1, 4, 2, 5]
- » {7, 6, 6, 8}
- » X[5, 12, 6, 13]
- » {8, 8, 4, 4}
- » X[3, 11, 4, 10]
- » {3, 3, 6, 7}
- » X[11, 3, 12, 2]
- » {3, 3, 8, 6}
- » X[7, 14, 8, 15]
- » {1, 1, 5, 5}
- » X[9, 16, 10, 1]
- » {2, 2, 7, 7}
- » X[13, 6, 14, 7]
- » {4, 4, 1, 1}
- » X[15, 8, 16, 9]
- » {5, 5, 2, 2}

In[ ]:= **A**

Out[ ]:=  $\{ \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\}, \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\},$   
 $\{0, 0, -4 + 2\lambda^2 + 2 \text{Conjugate}[\lambda]^2, 0, 0, -1 + \text{Conjugate}[\lambda]^2 + 2 \times (1 - \text{Conjugate}[\lambda]^2),$   
 $2 \times (1 - \text{Conjugate}[\lambda]^2), -1 + \text{Conjugate}[\lambda]^2, 0, 0\}, \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\},$   
 $\{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\}, \{0, 0, -1 + \lambda^2 + 2 \times (1 - \lambda^2), 0, 0, 0, 1 - \lambda^2 - 2 \times (1 - \lambda^2), 0, 0, 0, 0\},$   
 $\{0, 0, 2 \times (1 - \lambda^2), 0, 0, 1 - \text{Conjugate}[\lambda]^2 - 2 \times (1 - \text{Conjugate}[\lambda]^2),$   
 $0, 1 - \text{Conjugate}[\lambda]^2, 0, 0\}, \{0, 0, -1 + \lambda^2, 0, 0, 0, 1 - \lambda^2, 0, 0, 0, 0\},$   
 $\{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\}, \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\} \}$

In[ ]:= **Plot**[**MatrixSignature**[**A** /.  $\lambda \rightarrow e^{i t}$ ], {**t**, 0,  $\pi$ }]

