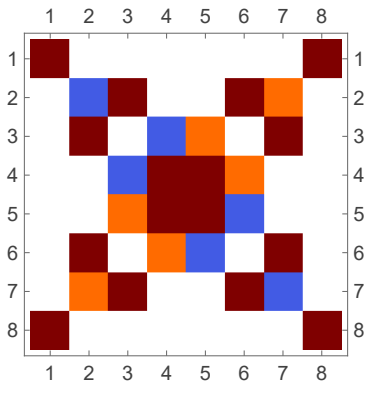
In[•]:=
```
(* Analysis of 𝕌 without scaling to Det=1 *)
N[φ 𝕌 /. φRep]
matCheck[φ 𝕌]
```

Out[•]=

$$\begin{pmatrix} -0.618034 & 0. & 0. & 0. & 0. & 0. & 0. & -2.61803 \\ 0. & -1. & 1.61803 & 0. & 0. & 1.61803 & 1. & 0. \\ 0. & 1.61803 & 0. & -1. & 1. & 0. & 1.61803 & 0. \\ 0. & 0. & -1. & 1.61803 & 1.61803 & 1. & 0. & 0. \\ 0. & 0. & 1. & 1.61803 & 1.61803 & -1. & 0. & 0. \\ 0. & 1.61803 & 0. & 1. & -1. & 0. & 1.61803 & 0. \\ 0. & 1. & 1.61803 & 0. & 0. & 1.61803 & -1. & 0. \\ -2.61803 & 0. & 0. & 0. & 0. & 0. & 0. & -0.618034 \end{pmatrix}$$

$$\begin{pmatrix} -\frac{1}{\varphi} & 0 & 0 & 0 & 0 & 0 & 0 & -\varphi^2 \\ 0 & -1 & \varphi & 0 & 0 & \varphi & 1 & 0 \\ 0 & \varphi & 0 & -1 & 1 & 0 & \varphi & 0 \\ 0 & 0 & -1 & \varphi & \varphi & 1 & 0 & 0 \\ 0 & 0 & 1 & \varphi & \varphi & -1 & 0 & 0 \\ 0 & \varphi & 0 & 1 & -1 & 0 & \varphi & 0 \\ 0 & 1 & \varphi & 0 & 0 & \varphi & -1 & 0 \\ -\varphi^2 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{\varphi} \end{pmatrix}$$

Out[•]=



Matrix Types:

- [x] Is a Matrix
- [ ] VolPreserving[Det=±1]
- [ ] PositiveDefinite[Eigen>0]
- [x] Traceless[ΣEigen=Tr=0]
- [x] Invertable
- [ ] ±Involutory
- [ ] Upper Triangular
- [ ] Lower Triangular
- [ ] Diagonal
- [ ] Orthogonal[m.$m^{\dagger}$=𝟙]
- [ ] LRSymmetric[m=Rev@m]
- [ ] Unitary[m.$m^{\dagger}$=𝟙]
- [x] Symmetric[m=$m^{\intercal}$]
- [ ] AntiSymmetric[m=−$m^{\intercal}$]
- [ ] Hermitian[m=$m^{\dagger}$]
- [ ] AntiHermitian[m=−$m^{\dagger}$]
- [x] CentroSymmetric[AJ = JA]
- [x] SkewCentroSymmetric[AJ=−JA]
- [ ] Hamiltonian[J=$A^{\intercal \text{ or } \dagger}$JA]
- [ ] SkewHamiltonian[J⇒−J]

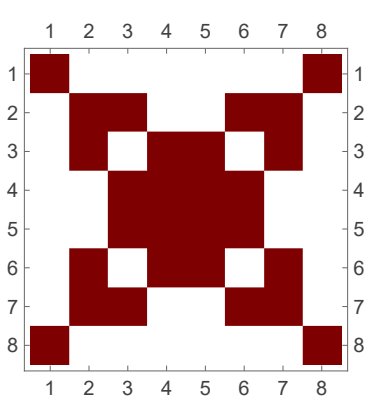
In[•]:=
```
(* Analysis of 𝕌 as Det=1 *)
N[𝕌 / 𝕌Det1f /. φRep]
matCheck[𝕌 / 𝕌Det1f]
```

Out[•]=

$$\begin{pmatrix} -0.242934 & 0. & 0. & 0. & 0. & 0. & 0. & -1.02909 \\ 0. & -0.393076 & 0.63601 & 0. & 0. & 0.63601 & 0.393076 & 0. \\ 0. & 0.63601 & 0. & -0.393076 & 0.393076 & 0. & 0.63601 & 0. \\ 0. & 0. & -0.393076 & 0.63601 & 0.63601 & 0.393076 & 0. & 0. \\ 0. & 0. & 0.393076 & 0.63601 & 0.63601 & -0.393076 & 0. & 0. \\ 0. & 0.63601 & 0. & 0.393076 & -0.393076 & 0. & 0.63601 & 0. \\ 0. & 0.393076 & 0.63601 & 0. & 0. & 0.63601 & -0.393076 & 0. \\ -1.02909 & 0. & 0. & 0. & 0. & 0. & 0. & -0.242934 \end{pmatrix}$$

$$\begin{pmatrix} -\frac{1}{2}\left(\frac{1}{\varphi}\right)^{3/2} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2\left(\frac{1}{\varphi}\right)^{3/2}} \\ 0 & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 & 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & \frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 \\ 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & \frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 \\ 0 & 0 & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & \frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{\frac{1}{\varphi}}}{2} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 & 0 \\ 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 & \frac{\sqrt{\frac{1}{\varphi}}}{2} & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 \\ 0 & \frac{\sqrt{\frac{1}{\varphi}}}{2} & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & 0 & 0 & \frac{1}{2\sqrt{\frac{1}{\varphi}}} & -\frac{\sqrt{\frac{1}{\varphi}}}{2} & 0 \\ -\frac{1}{2\left(\frac{1}{\varphi}\right)^{3/2}} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2}\left(\frac{1}{\varphi}\right)^{3/2} \end{pmatrix}$$

Out[•]=



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