In[1]:=
$$\mathbf{M} = \begin{pmatrix} 2 & 4 & -6 & 0 \\ 4 & 6 & -3 & -4 \\ 0 & 0 & 4 & 0 \\ 0 & 4 & -6 & 2 \end{pmatrix}$$

Out[1]=
```
{{2, 4, -6, 0}, {4, 6, -3, -4},
 {0, 0, 4, 0}, {0, 4, -6, 2}}
```

In[2]:=
```
Eigenvalues[M]
```

Out[2]=
```
{6, 4, 2, 2}
```

In[3]:=
```
NullSpace[
 M - 6 * IdentityMatrix[4]]
```

Out[3]=
```
{{1, 1, 0, 1}}
```

In[4]:=
```
NullSpace[
 M - 4 * IdentityMatrix[4]]
```

Out[4]=
```
{{0, 3, 2, 0}}
```

In[5]:=
```
NullSpace[
 M - 2 * IdentityMatrix[4]]
```

Out[5]=
```
{{1, 0, 0, 1}}
```

In[6]:=
```
NullSpace[MatrixPower[
   M - 2 * IdentityMatrix[4], 2]]
```

Out[6]=
```
{{1, 0, 0, 1}, {-1, 1, 0, 0}}
```

```
In[7]:= (M - 2 * IdentityMatrix[4]).
         {-1, 1, 0, 0}
```

$$\text{Out[7]}= \{4, 0, 0, 4\}$$

```
In[8]:= S = {{1, 1, 0, 1},
           {0, 3, 2, 0}, {1, 0, 0, 1},
           {-1 / 4, 1 / 4, 0, 0}}
```

$$\text{Out[8]}= \left\{\{1, 1, 0, 1\}, \{0, 3, 2, 0\}, \{1, 0, 0, 1\}, \left\{-\frac{1}{4}, \frac{1}{4}, 0, 0\right\}\right\}$$

```
In[9]:= T = Transpose[S]
```

$$\text{Out[9]}= \left\{\left\{1, 0, 1, -\frac{1}{4}\right\}, \left\{1, 3, 0, \frac{1}{4}\right\}, \{0, 2, 0, 0\}, \{1, 0, 1, 0\}\right\}$$

```
In[10]:= J = Inverse[T].M.T
```

$$\text{Out[10]}= \{\{6, 0, 0, 0\}, \{0, 4, 0, 0\}, \{0, 0, 2, 1\}, \{0, 0, 0, 2\}\}$$

```
In[11]:= MatrixForm[J]
```

Out[11]//MatrixForm=

$$\begin{pmatrix} 6 & 0 & 0 & 0 \\ 0 & 4 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 0 & 2 \end{pmatrix}$$