```
1 + 1
```

2

```
m = {{1, 2}, {3, 4}}
```

```
{{1, 2}, {3, 4}}
```

```
m.v
```

```
{{1, 2}, {3, 4}}.v
```

```
MatrixForm[m]
```

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

```
NullSpace[m]
```

{}

```
NullSpace[m.{x, y}]
```

NullSpace::matrix: 位置1の引数{x + 2 y, 3 x + 4 y}は非空の長方行列ではありません. ≫

```
NullSpace[{x + 2 y, 3 x + 4 y}]
```

```
A = [{6, -3, -7}, {-1, 2, 1}, {5, -3, -6}]
```

```
B = {{6, -3, -7}, {-1, 2, 1}, {5, -3, -6}}
```

```
{{6, -3, -7}, {-1, 2, 1}, {5, -3, -6}}
```

```
MatrixForm[B]
```

$$\begin{pmatrix} 6 & -3 & -7 \\ -1 & 2 & 1 \\ 5 & -3 & -6 \end{pmatrix}$$

```
Eigenvalues[B]
```

{2, -1, 1}

```
Eigenvactors[B]
```

General::spell1:
スペル間違いの可能性があります. 新規シンボル"Eigenvactors"はすでにあるシンボル"Eigenvectors"に似ています. ≫

```
Eigenvactors[{{6, -3, -7}, {-1, 2, 1}, {5, -3, -6}}]
```

```
Eigenvectors[B]
```

```
{{1, -1, 1}, {1, 0, 1}, {2, 1, 1}}
```

```
S = {{1, 1, 2}, {-1, 0, 1}, {1, 1, 1}}
```

```
{{1, 1, 2}, {-1, 0, 1}, {1, 1, 1}}
```

```
MatrixForm[S
]
```

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

```
Inverse[S]
```

```
{{1, -1, -1}, {-2, 1, 3}, {1, 0, -1}}
```

```
MatrixForm[S]
```

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

```
MatrixForm[Inverse[S]]
```

$$\begin{pmatrix} 1 & -1 & -1 \\ -2 & 1 & 3 \\ 1 & 0 & -1 \end{pmatrix}$$

```
MatrixForm[Inverse[S].B.S]
```

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

```
s = {{2, 1, 1}, {1, 0, -1}, {1, 1, 1}}
```

```
{{2, 1, 1}, {1, 0, -1}, {1, 1, 1}}
```

```
MatrixForm[Inverse[s].B.s]
```

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

```
ss = {{1, 2, 1}, {0, 1, -1}, {1, 1, 1}}
MatrixForm[Inverse[ss].B.ss]
```

```
{{1, 2, 1}, {0, 1, -1}, {1, 1, 1}}
```

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

```
Det[B.E - Inverse[B]]
```

```
1/2 + 3 {{6, -3, -7}, {-1, 2, 1}, {5, -3, -6}}.e
```

```
e = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
Eigenvalues[B.e - Inverse[B]]
```

Set::wrsym: シンボルeはProtectedです. ≫

```
{{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
```

$$\left\{-1,\ \frac{1}{4}\left(1+6\,\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e-\sqrt{3}\,\sqrt{\left(3+20\,\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e+12\,(\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e)^2\right)}\right),\ \frac{1}{4}\left(1+6\,\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e+\sqrt{3}\,\sqrt{\left(3+20\,\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e+12\,(\{\{6,-3,-7\},\{-1,2,1\},\{5,-3,-6\}\}.e)^2\right)}\right)\right\}$$

```
e = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
Eigenvalues[B.e - Inverse[B]]
```

```
{{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
```

$$\left\{\frac{3}{2},\ 0,\ 0\right\}$$

```
Inverse[B]
```

$$\left\{\left\{\frac{9}{2},\ -\frac{3}{2},\ -\frac{11}{2}\right\},\ \left\{\frac{1}{2},\ \frac{1}{2},\ -\frac{1}{2}\right\},\ \left\{\frac{7}{2},\ -\frac{3}{2},\ -\frac{9}{2}\right\}\right\}$$

```
Eigenvalues[B - Inverse[B]]
```

$$\left\{\frac{3}{2},\ 0,\ 0\right\}$$

```
AA = {{1, 2, 1}, {-1, 4, 1}, {2, -4, 0}}
Eigenvectors[AA]
```

```
{{1, 2, 1}, {-1, 4, 1}, {2, -4, 0}}
```

```
{{1, 0, 1}, {2, 1, 0}, {-1, -1, 2}}
```

```
BB = {{1, 2, -1}, {0, 1, -1}, {1, 0, 2}}
Inverse[BB].AA.BB
```

```
{{1, 2, -1}, {0, 1, -1}, {1, 0, 2}}
```

```
{{2, 0, 0}, {0, 2, 0}, {0, 0, 1}}
```

Set::write: −59982.8 − 4 + 399.943 + 399.943 + 49985.7 + 49985.7のタグPlusはProtectedです. ≫

```
a = {{4, 0, -1}, {-3, 1, 5}, {-2, -2, 7}}
2. a
```

```
{{4, 0, -1}, {-3, 1, 5}, {-2, -2, 7}}
```

```
{{8., 0, -2.}, {-6., 2., 10.}, {-4., -4., 14.}}
```

```
b = 2. MatrixPower[a, 4] - 27. MatrixPower[a, 3] +
   130. MatrixPower[a, 2] - 260. MatrixPower[a, 1] + 180. e
```

```
{{4., 0., -1.}, {-3., 1., 5.}, {-2., -2., 7.}}
```

```
Eigenvalues[Inverse[b]]
```

```
{0.333333, 0.25, 0.2}
```

```
Eigenvectors[b]
```

```
{{-0.408248, 0.816497, 0.408248},
 {0.707107, -0.707107, 1.18735 × 10^-15}, {0.57735, 0.57735, 0.57735}}
```

```
0.816497 / 0.408248
```

```
2.
```

```
c = {{4, 0, -1}, {-3, 1, 5}, {-2, -2, 7}}
Eigenvalues[Inverse[c]]
Eigenvectors[c]
```

```
{{4, 0, -1}, {-3, 1, 5}, {-2, -2, 7}}
```

$$\left\{\frac{1}{3}, \frac{1}{4}, \frac{1}{5}\right\}$$

```
{{-1, 2, 1}, {-1, 1, 0}, {1, 1, 1}}
```

```
p = {{-1, -1, 1}, {2, 1, 1}, {1, 0, 1}}
Inverse[p].c.p
```

```
{{-1, -1, 1}, {2, 1, 1}, {1, 0, 1}}
```

```
{{5, 0, 0}, {0, 4, 0}, {0, 0, 3}}
```

```
Inverse[p]
```

```
{{-1, -1, 2}, {1, 2, -3}, {1, 1, -1}}
```

```
aa = {{3, 2, 4}, {2, 0, 2}, {4, 2, 3}}
MatrixForm[aa]
Eigenvalues[aa]
Eigenvectors[aa]
```

```
{{3, 2, 4}, {2, 0, 2}, {4, 2, 3}}
```

$$\begin{pmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{pmatrix}$$

```
{8, -1, -1}
```

```
{{2, 1, 2}, {-1, 0, 1}, {-1, 2, 0}}
```

```
pp = {{2, -1, -1}, {1, 0, 2}, {2, 1, 0}}
Inverse[pp]
Inverse[pp].aa.pp
MatrixForm[Inverse[pp].aa.pp]
```

```
{{2, -1, -1}, {1, 0, 2}, {2, 1, 0}}
```

$$\left\{\left\{\frac{2}{9}, \frac{1}{9}, \frac{2}{9}\right\}, \left\{-\frac{4}{9}, -\frac{2}{9}, \frac{5}{9}\right\}, \left\{-\frac{1}{9}, \frac{4}{9}, -\frac{1}{9}\right\}\right\}$$

```
{{8, 0, 0}, {0, -1, 0}, {0, 0, -1}}
```

$$\begin{pmatrix} 8 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$$

In[1]:=
```
aaa = {{5, -3}, {-3, 5}}
MatrixForm[aaa]
Eigenvalues[aaa]
Eigenvectors[aaa]
```

Out[1]=
```
{{5, -3}, {-3, 5}}
```

Out[2]//MatrixForm=

$$\begin{pmatrix} 5 & -3 \\ -3 & 5 \end{pmatrix}$$

Out[3]=
```
{8, 2}
```

Out[4]=
```
{{-1, 1}, {1, 1}}
```

In[13]:=
```
ppp = {{1, -1}, {1, 1}} / Sqrt[2]
MatrixForm[ppp]
Inverse[ppp]
MatrixForm[Inverse[ppp]]
Inverse[ppp].aaa.ppp
```

Out[13]= $\left\{\left\{\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right\}, \left\{\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right\}\right\}$

Out[14]//MatrixForm=

$$\begin{pmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$$

Out[15]= $\left\{\left\{\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right\}, \left\{-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right\}\right\}$

Out[16]//MatrixForm=

$$\begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$$

Out[17]= {{2, 0}, {0, 8}}