

```
m = {{a, b}, {c, d}}
```

```
{{a, b}, {c, d}}
```

```
MatrixForm[m]
```

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

```
Det[%]
```

$$-b\,c+a\,d$$

$$\begin{pmatrix} 4 & 9 & -1 & 2 & 9 \\ 0 & \square & \square & \square & \square \\ \square & \square & \square & \square & \square \\ \square & \square & \square & \square & \square \\ \square & \square & \square & \square & \square \end{pmatrix} \begin{pmatrix} a & \square & 3 & \square & \square & o & b \\ \square & \square & \square & \square & \square & \square & \square \\ \square & \square & \square & 4 & 1 & \square & \square \\ \square & \square & \square & \square & \square & \square & \square \\ c & \square & \square & \square & \square & \square & d \\ \square & \square & \square & \square & \square & \square & \square \end{pmatrix}$$

$$\begin{pmatrix} -9 & 3 & 6 \\ 7 & -7 & 0 \\ 5 & -8 & 0.5 \end{pmatrix} \cdot \begin{pmatrix} 0 & \frac{2}{5} & 1 \\ -5 & 9 & 4 \\ -2 & 0.25 & 10 \end{pmatrix}$$

```
{{-27., 24.9, 63.}, {35., -60.2, -21.}, {39., -69.875, -22.}}
```

```
Tr[%]
```

$$-109.2$$

```
MatrixForm[
```

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

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

```
Table[ $\frac{2+i}{j^2+1}$ , {i, 4}, {j, 4}]
```

$$\left\{ \left\{ \frac{3}{2}, \frac{3}{5}, \frac{3}{10}, \frac{3}{17} \right\}, \left\{ 2, \frac{4}{5}, \frac{2}{5}, \frac{4}{17} \right\}, \left\{ \frac{5}{2}, 1, \frac{1}{2}, \frac{5}{17} \right\}, \left\{ 3, \frac{6}{5}, \frac{3}{5}, \frac{6}{17} \right\} \right\}$$

```
MatrixForm[%]
```

$$\begin{pmatrix} \frac{3}{2} & \frac{3}{5} & \frac{3}{10} & \frac{3}{17} \\ 2 & \frac{4}{5} & \frac{2}{5} & \frac{4}{17} \\ \frac{5}{2} & 1 & \frac{1}{2} & \frac{5}{17} \\ 3 & \frac{6}{5} & \frac{3}{5} & \frac{6}{17} \end{pmatrix}$$

```
B = N[%]
```

```
{{1.5, 0.6, 0.3, 0.176471}, {2., 0.8, 0.4, 0.235294},  
{2.5, 1., 0.5, 0.294118}, {3., 1.2, 0.6, 0.352941}}
```

Transpose[B]

```
{ {1.5, 2., 2.5, 3.}, {0.6, 0.8, 1., 1.2},
  {0.3, 0.4, 0.5, 0.6}, {0.176471, 0.235294, 0.294118, 0.352941} }
```

Det[B]

0.

Inverse[B]

Inverse::sing : Matrix {{1.5, 0.6, 0.3, 0.176471}, {2., 0.8, 0.4, 0.235294}, {2.5, 1., 0.5, 0.294118}, {3., 1.2, 0.6, 0.352941}} is singular. >>

```
Inverse[ { {1.5, 0.6, 0.3, 0.176471}, {2., 0.8, 0.4, 0.235294},
  {2.5, 1., 0.5, 0.294118}, {3., 1.2, 0.6, 0.352941} } ]
```

A = Table $\left[\frac{1}{i+j-1}, \{i, 4\}, \{j, 4\}\right]$

```
{ {1, 1/2, 1/3, 1/4}, {1/2, 1/3, 1/4, 1/5}, {1/3, 1/4, 1/5, 1/6}, {1/4, 1/5, 1/6, 1/7} }
```

MatrixForm[A]

$$\begin{pmatrix} 1 & \frac{1}{2} & \frac{1}{3} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{3} & \frac{1}{4} & \frac{1}{5} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{5} & \frac{1}{6} \\ \frac{1}{4} & \frac{1}{5} & \frac{1}{6} & \frac{1}{7} \end{pmatrix}$$

Det[A]

$$\frac{1}{6048000}$$

Inverse[A]

```
{ {16, -120, 240, -140}, {-120, 1200, -2700, 1680},
  {240, -2700, 6480, -4200}, {-140, 1680, -4200, 2800} }
```

MatrixForm[%]

$$\begin{pmatrix} 16 & -120 & 240 & -140 \\ -120 & 1200 & -2700 & 1680 \\ 240 & -2700 & 6480 & -4200 \\ -140 & 1680 & -4200 & 2800 \end{pmatrix}$$

N[Eigenvalues $\left[\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}\right]$ **]**

{3., 1.}

N[Eigenvectors $\left[\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}\right]$ **]**

{{-1., 1.}, {1., 1.}}

N[Eigenvalues[A]

{1.50021, 0.169141, 0.00673827, 0.0000967023}

Dimensions[A]

{4, 4}

$$S = \begin{pmatrix} 1 & -1 \\ 5 & -3 \end{pmatrix}$$

{{1, -1}, {5, -3}}

N[Eigenvalues[S]]

{-1. + 1. i, -1. - 1. i}

FindRoot[x² - 4 x + 3 == 0, {x, 2.5}]

{x → 3.}

FindRoot[x² - 4 x + 3 == 0, {x, 0.5}]

{x → 1.}

FindRoot[x² - 4 x + 3 == 0, {x, 0}]

{x → 1.}

NSolve[x⁵ - 2 x + 3 == 0, x]

{{x → -1.42361}, {x → -0.246729 - 1.32082 i}, {x → -0.246729 + 1.32082 i},
{x → 0.958532 - 0.498428 i}, {x → 0.958532 + 0.498428 i}}

NSolve[x⁵ - 2 x + 3 == 0, x, Reals]

{{x → -1.42361}}

Solve[x² + y² == 1 && x² - y² == 1, {x, y}]

{{x → -1, y → 0}, {x → 1, y → 0}}

Solve[-7 x + 2 y == 0.65 && 3 x - y == 8, {x, y}]

{{x → -16.65, y → -57.95}}

LinearSolve[{a, b}, {c, d}], {m, n}]

$$\left\{ \frac{d m - b n}{-b c + a d}, \frac{c m - a n}{b c - a d} \right\}$$

LinearSolve[{0.5, -12.75}, {26, 10}], {2, -7}]

{-0.205795, -0.164933}

LinearSolve[{1, 2}, {3, 8}], {3, -1}]

{13, -5}

LinearSolve[{1, 0.5, 1./3.}, {0.5, 1./3., 0.25}, {1./3., 0.25, 0.2}], {-1, 2, 5}]

{69., -480., 510.}

```
LinearSolve[{{1, 5, 8}, {-3, 4, 7}}, {-12, 16, 28}}, {1, 8, 2}]
```

```
LinearSolve::nosol : Linear equation encountered that has no solution. >>
```

```
LinearSolve[{{1, 5, 8}, {-3, 4, 7}}, {-12, 16, 28}}, {1, 8, 2}]
```

```
a = 24;
```

```
b = 69;
```

```
c = a^2 + b^3
```

```
329 085
```

$$\begin{pmatrix} \square & \square & \square & \square & \square & \square \\ \square & \square & \square & \square & \square & \square \\ \square & \square & \square & \square & \square & \square \\ \square & \square & \square & \square & \square & \square \end{pmatrix}$$