

Mathematica 4 - [Matrix Theory.nb]

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Matrix Theory.nb

$\text{Tr}\left[\begin{pmatrix} 2 & -3 \\ 8 & -7 \end{pmatrix}\right]$
 $\text{Det}\left[\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}\right]$
 $\text{Inverse}\left[\begin{pmatrix} 7 & 4 \\ 2 & 1 \end{pmatrix}\right]$
 $\text{Transpose}\left[\begin{pmatrix} -4 & 9 \\ 2 & 0 \end{pmatrix}\right]$
 $\text{Eigenvalues}\left[\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}\right]$
 $\text{Eigenvectors}\left[\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}\right]$
 $\text{LinearSolve}\left[\begin{pmatrix} 2 & 3 \\ 1 & 1 \end{pmatrix}, \begin{pmatrix} 5 \\ 2 \end{pmatrix}\right]$
 $\text{Solve}\left[\{2x + 3y == 5, 4x - 3y == 8\}, \{x, y\}\right]$
 $\text{RowReduce}\left[\begin{pmatrix} 2 & 3 \\ 1 & 1 \end{pmatrix}\right]$
 $\text{RowReduce}\left[\begin{pmatrix} 3 & 3 \\ 1 & 1 \end{pmatrix}\right]$

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Arithmetic and Numbers
Algebra
Lists and Matrices
 Creating Lists and Matrices
 When entering a vector or a matrix, add rows by typing `[[a, b]]` and add columns by typing `[[a, b]]`.
 $\begin{pmatrix} a \\ b \end{pmatrix}$ $(a \ b)$ $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$
 One way to create lists and matrices automatically is to iterate a variable over a range of values with `Table`, using the iterator `{var, min, max}` or `{var, min, max, increment}`. When given a list, many math functions operate on each element of the list.
`Table[a, {a, 0, 10}]`
`Table[a, {a, 0, 10, 2}]`
`Table[a, {a, 0, 10}, {b, 0, 10}]`
Matrix Operations
`Dot`
`Cross[a, b]`
`Outer[a, b, c]`
`ListConvolve[a, b]`
`ListCorrelate[a, b]`
`Tr[a]`
`Det[a]`
`Inverse[a]`
`Transpose[a]`
`Eigenvalues[a]`
`Eigenvectors[a]`
`LinearSolve[a, b]`
`RowReduce[a]`
 A common variation of the convolution and correlation operations is to "pad" the data set with zeros. For vectors, the following forms can be used:
`ListConvolve[a, b, {1, -1}, 0]`
`ListCorrelate[a, b, {1, -1}, 0]`
Trigonometric and Exponential Functions

`Expand[a]`
`Factor[a]`
`Together[a]`
`Apart[a]`
`Cancel[a]`
`Simplify[a]`
`FullSimplify[a]`
`TrigExpand[a]`
`TrigFactor[a]`
`TrigReduce[a]`
`ExpToTrig[a]`
`TrigToExp[a]`
`PowerExpand[a]`
`ComplexExpand[a]`

a^x
 \sqrt{x}
 $\sqrt[n]{x}$
 $\int a dx$
 $\int_0^1 a dx$
 $\sum_{i=1}^n a_i$
 $\prod_{i=1}^n a_i$
 $\frac{d}{dx} a$
 $\frac{d^2}{dx^2} a$
 $\frac{d^3}{dx^3} a$
 $\frac{d^4}{dx^4} a$
 $\frac{d^5}{dx^5} a$
 $\frac{d^6}{dx^6} a$
 $\frac{d^7}{dx^7} a$
 $\frac{d^8}{dx^8} a$
 $\frac{d^9}{dx^9} a$
 $\frac{d^{10}}{dx^{10}} a$

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