**Mathematics in GNU Octave**

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**A. USING COMMAND LINE / TERMINAL AND IDE**

Octave can be used through either the command line or terminal or its integrated development environment. All of the examples below are completed using the terminal.

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**I. ELEMENTARY OPERATIONS**

**Addition, Subtraction, Multiplication, and Division**

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**Squares and Square Roots**

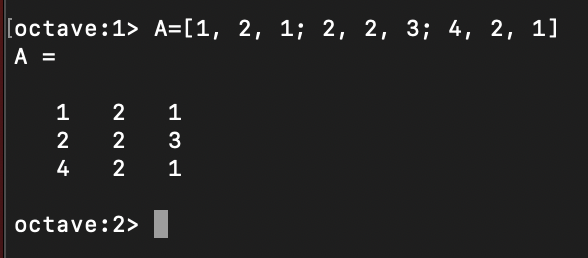
**A black screen with white text

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**II. MATRICES**

**Creating Matrices**

Each column is divided by a semicolon. This is a 3 x 3 matrix.



**Matrix Operations**

Matrix multiplication is shown below. A\*B does not work since the number of columns of A does not equal the number of rows of B.

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A’ is the transpose of A, the interchanging of rows and columns.

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**III. DATA CONTAINERS**

**Cell Arrays**

A cell array can store several variables of different size or type in one variable.

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**IV. FUNCTION PLOTTING**

**Two-Dimensional Function Plotting**

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Graphical user interface, histogram

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Chart

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**Three-Dimensional Function Plotting**

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Chart, surface chart

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To graph with contour lines, change “mesh” to “meshc”.

Chart, surface chart

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**V. ARITHMETIC**

**Exponents and Logarithms**

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**Floor and Ceiling Functions**

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**Rounding**

Graphical user interface, text, application

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**Factorials**

Graphical user interface, application

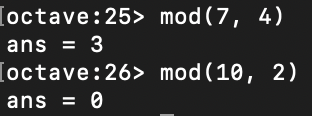
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**Maximum and Minimum**

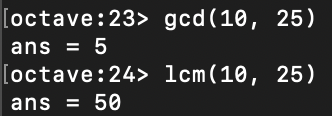
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**Modulo**



**Least Common Multiple and Greatest Common Divisor**



**VI. DIFFERENTIAL EQUATIONS**

**Derivatives**

By downloading the “optim” package and ensuring to run it every time it gets used, derivatives can be calculated using the form:

Graphical user interface

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**Integrals**

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Graphical user interface, text, application

Description automatically generated

**VII. LINEAR ALGEBRA**

**Determinants**

**Graphical user interface, text

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**Inverse**

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**Eigenvalues**

Graphical user interface, text, application

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**Dot and Cross Products**

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**Solving Linear Systems**

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In addition to the Linear Algebra examples above, other topics such as rank, dimension, and null spaces can also be calculated.

**VIII. STATISTICS**

**Mean, Median, and Mode**

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**Standard Deviation and Variance**

Graphical user interface, text, application

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**Set Operations**

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Graphical user interface, application

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There are also functions to calculate probability density functions and cumulative distribution functions.