

Comparison of numerical-analysis software

The following tables provide a **comparison of numerical-analysis software**.

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Applications

General

	Creator	Development started	First public release	Latest stable version	Stable release date	Cost (USD)	License	Notes
<u>ADMB</u>	David Fournier, ADMB Project	1989	1990	12.0	21 December 2017	Free	BSD 3-clause (aka new) License	Automatic differentiation makes it well suited to complex minimization problems
<u>Analytica</u>	Lumina Decision Systems	1982 (Demos)		4.6	May 2015	Free (Analytica Free 101), \$995 (Professional), \$2795 (Enterprise)	Proprietary	A numerical modeling environment with a <u>declarative and visual programming language</u> based on <u>influence diagrams</u> .
<u>Ch</u>	SoftIntegration		1 October 2001	7.5.1	2 December 2015	\$399 (commercial) / \$199 (academic) / Free (student)	Proprietary	C/C++ based numerical computing and graphical plotting ^[1]
<u>DADiSP</u>	DSP Development	1984	1987	6.7 B02	17 January 2017	\$1995 (commercial) / \$129 (academic) / Free (student)	Proprietary	Numeric computations for science and engineering featuring a <u>spreadsheet</u> like interface.
<u>Dyalog APL</u>	Dyalog Ltd.	1981	1983	17.0	23 July 2018	£850/year or 2% royalty (free for non-commercial use)	Proprietary	A modern dialect of APL, enhanced with features for functional and object-oriented programming.
<u>Euler Math Toolbox</u>	René Grothmann	1987	1988	2019-08-21	21 August 2019	Free	GPL	Also a computer algebra system through interface with <u>Maxima</u>
<u>Fityk</u>	Marcin Wojdyr		2002	1.3.1	19 December 2016	\$115 (1.x binaries) / Free (source code and 0.x binaries)	GPL	interactive graphics, scriptable, specialized in curve fitting and peak fitting, 2D only
<u>FlexPro</u>	Weisang GmbH	n/a	1991	2017	2017	Not free (commercial) / Free (academic)	Proprietary	Dynamic, interactive 2D/3D diagrams, programmable, VBA, high performances, multicore compatible, large data sets.
<u>FreeMat</u>	Samit Basu		2004	4.2	30 June 2013	Free	GPL	Codeless interface to external C, C++, and Fortran code. Mostly compatible with MATLAB.
<u>GAUSS</u>	Aptech Systems		1984	19	1 January 2019	Not free	Proprietary	
<u>GNU Data Language</u>	Marc Schellens		2004	0.9.7	21 January 2017	Free	GPL	Aimed as a drop-in replacement for IDL/PV-WAVE
<u>IBM SPSS Statistics</u>	Normal H. Nie, Dale H. Bent, and C. Hadlai Hull		1968	23.0	3 March 2015	Not free	Proprietary	Primarily for statistics
<u>GNU MCSim</u>	Frederic Y. Bois & Don Maszle	1991	1993	6.0.0	24 February 2018	Free	GPL	General simulation and Monte Carlo sampling software
<u>GNU Octave</u>	John W. Eaton	1988	1993	5.1.0	1 March 2019	Free	GPL	General numerical computing package with lots of extension modules. Syntax mostly compatible with MATLAB
<u>IGOR Pro</u>	WaveMetrics	1986	1988	8.00	May 22, 2018	\$995 (commercial) \$225 upgrade / \$499 (academic) \$175 upgrade / \$85 (student)	Proprietary	interactive graphics, programmable, 2D/3D, used for science and engineering, large data sets.
<u>J</u>	Jsoftware	1989	1990	J806	12 November 2017	Free	GPL	online access to: J Application Library (JAL)

	Creator	Development started	First public release	Latest stable version	Stable release date	Cost (USD)	License	Notes
<u>Julia</u>	Jeff Bezanson, Stefan Karpinski, Viral B. Shah, and other ^[2] contributors	2009	2012	1.2.0	20 August 2019	Free	MIT License	A fast ^[3] [4] ^[5] , high-level numerical computing language. [Note 1]
<u>LabPlot</u>	Stefan Gerlach	2001	2003	2.6.0	19 April 2019	Free	GPL	data analysis, nonlinear curve fitting in 2D, data picking from images, live data plotting
<u>LabVIEW</u>	National Instruments	1985	1986	2016	August 2016	\$1249 (commercial) / \$79.95 (student)	Proprietary	Graphical, and textual through formula nodes, mathscript and .m file scripts ^[6]
<u>Maple</u>	Maplesoft	1980	1982	2019.1 (May 28, 2019) [±] (https://en.wikipedia.org/w/index.php?title=Template:Latest_stable_software_release/Maple&action=edit) ^[7]	14 March 2019	\$2390 (commercial) / \$239 (personal) / \$99 (student)	Proprietary	Mainly a computer algebra system
<u>Mathcad</u>	Parametric Technology Corporation	1985	1986	15.0 ; Prime 4.0 ^[8]	2 March 2015	\$1195 (commercial) / \$99 (student)	Proprietary	
<u>Mathematica</u>	Wolfram Research	1986	1988	12.0.0 (April 16, 2019) [±] (https://en.wikipedia.org/w/index.php?title=Template:Latest_stable_software_release/Mathematica&action=edit) ^[9]	8 March 2018	Free (Raspberry Pi ^[10]), Free Cloud Access (https://www.open.wolframcloud.com/), \$2495 (commercial) / \$145 (student) / \$295 (personal) ^[11]	Proprietary	Also computer algebra system
<u>MATLAB</u>	MathWorks	late 1970s	1984	9.5 (R2018b)	12 September 2018	\$2150 (standard) / \$500 (education) / \$149 (home) / \$49 (student)	Proprietary	Numerical computation and simulation with extended 2D/3D visualization. Emphasis on vectorised processing.
<u>Maxima</u>	MIT Project MAC and Bill Schelter et al.	1967	1982	5.41.0	3 October 2017	Free	GPL	Mainly a computer algebra system
<u>MLAB</u>	Civilized Software, Inc.	1970 (in SAIL), 1985 (in C)	1972 (on DEC-10), 1988 (on PCs), 1993 (on MACs)	2015	2015	\$2250 (standard) / \$50 (student)	Proprietary	Numerical and Statistical computation for Scientific Applications, e.g. Chemical Kinetics. ODE Solving and Curve-Fitting. Symbolic Differentiation, Survival Analysis, Cluster Analysis, 2D/3D Graphics.
<u>Origin</u>	OriginLab		1991	2019b	April 24, 2019	\$1095 (std.)/\$1800 (Pro) \$550 (std., academic) \$850 (Pro, academic) \$69/yr. (Pro, student)	Proprietary	Integrated data analysis graphing software for science and engineering. Flexible multi-layer graphing framework. 2D, 3D and statistical graph types. Built-in digitizing tool. Analysis with auto recalculation and report generation. Built-in scripting and programming languages.

	Creator	Development started	First public release	Latest stable version	Stable release date	Cost (USD)	License	Notes
<u>Perl Data Language</u>	Karl Glazebrook	1996	c. 1997	2019	5 May 2018	Free	<u>Artistic License</u>	Used for astrophysics, solar physics, oceanography, biophysics, and simulation. 2D plotting via PGPLOT, PLPlot bindings; 3D via GL.
<u>PSPP</u>	Ben Pfaff	1990s	1990s	1.2.0	6 November 2018	Free	<u>GPL v.3</u> or later	FOSS statistics program, intended as an alternative to IBM SPSS Statistics. [Note 2]
<u>R</u>	R Foundation	1997	1997	3.5.2	20 December 2018	Free	<u>GPL</u>	Primarily for statistics, but there are many interfaces to open-source numerical software
<u>SageMath</u>	<u>William Stein</u>		2005	8.8 (27 June 2019) [±] (https://en.wikipedia.org/w/index.php?title=Template:Latest_stable_software_release/SageMath&action=edit) ^[12]	27 June 2019	Free	<u>GPL</u>	Programmable, includes computer algebra, 2D+3D plotting. Interfaces to many open-source and proprietary software. Web based interface <u>HTTP</u> or <u>HTTPS</u>
<u>SAS</u>	<u>Anthony Barr and James Goodnight</u>	1966	1972	9.4	10 July 2014	Not free	<u>Proprietary</u>	Mainly for statistics
<u>SequenceL</u>	<u>Texas Multicore Technologies</u>	1989	2012	2.4	10 February 2016	Free (Community Edition), \$2495 (Professional Edition)	Proprietary	Functional programming language and tools. [Note 3]
<u>S-Lang</u>	John E. Davis		1992	2.3.0	18 September 2014	Free	<u>GPL</u> , <u>Artistic License</u> (1.x only)	Available as a standalone (slsh) and embedded interpreter (<u>jed</u> , <u>slrn</u> , ...)
<u>Scilab</u>	<u>Scilab Enterprises Was:Inria</u>	1990	1994	6.0.2	14 February 2019	Free	<u>GPL</u>	Programmable, direct support of 2D+3D plotting. Interfaces to many other software packages. Interfacing to external modules written in C, Java, Python or other languages. Language syntax similar to MATLAB. Used for numerical computing in engineering and physics.
<u>Sysquake</u>	<u>Calerga</u>		1998	5.0	2013	free / \$2500 (Pro, commercial) / \$1000 (Pro, academic)	Proprietary	interactive graphics
<u>TK Solver</u>	<u>Universal Technical Systems, Inc.</u>	late 1970s	1982	5.0.141	2011	\$399 commercial / \$49 (student)	Proprietary	Numerical computation and rule-based application development
<u>VisSim</u>	Visual Solutions		1989	10.1	January 2011	\$495-\$2800 (commercial) free view-only version \$50-\$250/free v3.0 (academic)	Proprietary	<u>Visual Language</u> for simulation and Model Based Design. Used in business, science and engineering. Performs complex scalar or matrix based ODE solving with parametric optimization. Has 2D and 3D plotting, 3D animation, and state transition built in.

	Creator	Development started	First public release	Latest stable version	Stable release date	Cost (USD)	License	Notes
<u>Yorick</u>	n/a	n/a	n/a	9	January 2015	Free	<u>GPL</u>	Programmable, callable 2D+3D plotting. Language syntax similar to C. Interfacing to other software packages via C calls.

Operating system support

The operating systems the software can run on natively (without emulation).

	<u>Windows</u>	<u>macOS</u>	<u>Linux</u>	<u>BSD</u>	<u>Unix</u>	<u>DOS</u>	<u>Android</u>	<u>SaaS</u>
<u>ADMB</u>	Yes	Yes	Yes	No	No	No	No	No
<u>Analytica</u>	Yes	No	No	No	No	No	No	No
<u>Ch</u>	Yes	Yes	Yes	Yes	Yes	No	No	No
<u>Dyalog APL</u>	Yes	Yes	Yes	No	Yes	No ^[Note 4]	No	No
<u>DADiSP</u>	Yes	No	No	No	Yes	No	No	No
<u>Euler Math Toolbox</u>	Yes	No	Yes	No	No	No	No	No
<u>FlexPro</u>	Yes	No	No	No	No	No	No	No
<u>FreeMat</u>	Yes	Yes	Yes	Yes	Yes	No	No	No
<u>GAUSS</u>	Yes	Yes	Yes	No	Yes	No	No	No
<u>GNU Data Language</u>	Yes	Yes	Yes	Yes	Yes	No	No	No
<u>GNU MCSim</u>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<u>GNU Octave</u>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<u>IGOR Pro</u>	Yes	Yes	No	No	No	No	No	No
<u>Julia</u>	Yes	Yes	Yes	Yes	No	No	No	No
<u>LabVIEW</u>	Yes	Yes	Yes	No	Yes	No	No	No
<u>Maple</u>	Yes	Yes	Yes	No	Yes	No	No	No
<u>Mathematica</u>	Yes	Yes	Yes	Yes	Yes	No	No	Yes
<u>MATLAB</u>	Yes	Yes	Yes	Yes	Yes	No	No	No
<u>MLAB</u>	Yes	Yes	Yes	No	No	Yes	No	No
<u>Origin</u>	Yes	No	No	No	No	No	No	No
<u>Perl Data Language</u>	Yes	Yes	Yes	Yes	Yes	Yes	No	No
<u>R</u>	Yes	Yes	Yes	Yes	Yes	No	No	No
<u>SageMath</u>	Yes	Yes	Yes	No	Yes	No	No	Yes
<u>SAS</u>	Yes	No	Yes	No	Yes	No	No	No
<u>SequenceL</u>	Yes	Yes	Yes	No	No	No	No	No
<u>S-Lang</u>	Yes	Yes	Yes	Yes	Yes	Yes	No	No
<u>Scilab</u>	Yes	Yes	Yes	Yes	Yes	Yes	No	No
<u>Sysquake</u>	Yes	Yes	Yes	No	No	No	No	No
<u>TK Solver</u>	Yes	No	No	No	No	No	No	No
<u>The Unscrambler</u>	Yes	No	No	No	No	No	No	No
<u>VisSim</u>	Yes	Yes	Yes	No	Yes	No	No	No

Language features

Colors indicate features available as

basic system capabilities
official or officially supported extensions and libraries
third-party software components or not supported

	Standalone executables creation support	Symbolic computation support	OOP support	GUI creation support	Multi-dimensional arrays as primitive data type	Centralized extension library website	Can call code in other languages	Can be called from other languages
<u>Analytica</u>	No	No	Yes	Yes	Yes	Yes	<u>COM</u> , <u>Excel</u>	<u>Excel</u> , <u>COM</u> , <u>.NET</u>
<u>Dyalog APL</u>	Yes ^[13]	Yes	Yes ^[14]	Win32, .NET, WPF, HTML/JS	Yes	Yes	COM, .NET, WebServices, Shared Libraries, DLLs, NAG, R, JavaScript ^[15]	COM, .NET, WebServices ^[15]
<u>GNU Data Language</u>	No	No	Yes	GUI Widgets since v.0.9 but still incomplete	Yes	No	<u>C</u> , <u>Python</u>	<u>Python</u>
<u>GNU MCSim</u>	Yes	No	No	XMCSim with TCL/TK and wish	No	No	<u>C</u>	<u>R</u>
<u>GNU Octave</u>	Yes with mkoctfile	only with GiNaC extension	Yes ^[16]	Yes	Yes	Yes ^[17]	<u>C++</u> , <u>Fortran</u> , ^[18] <u>Perl</u> , ^[19] <u>Tcl</u> ^[20]	<u>Java</u> , ^[21] <u>Perl</u> , ^[19] <u>C++</u> ^[22]
<u>J</u>	No	Yes	Yes	Yes	Yes	Yes	<u>JavaScript</u>	<u>JavaScript</u>
<u>Julia</u>	Yes	No	Yes	Yes	Yes	Yes	<u>C</u> , <u>Fortran</u> <u>Python</u> , <u>C++</u> , <u>Java</u> , <u>MATLAB</u>	<u>C/C++</u>
<u>LabVIEW</u>	Professional System version With add-on ^[23]	No	Yes ^[24] GOOP ^[25] G# ^[26]	Yes	Yes	Yes ^[27]	<u>C/C++</u> , ^[28] <u>DLLs</u> , <u>Python</u> , ^[29] <u>Perl</u> , <u>Tcl</u> , ^[30] <u>MATLAB</u> , <u>ActiveX</u> , <u>C#</u> , <u>.NET</u> With add-ons. I.e. ^[31]	Yes ^[32]
<u>Maple</u>	No	Yes	Yes ^[33]	Yes	Yes	Yes ^[34]	<u>C</u> , <u>C#</u> , <u>Fortran</u>	<u>MATLAB</u> , ^[35] <u>Excel</u> , ^[36] <u>VisualBasic</u> , <u>Java</u> , and <u>C</u> ^[37]
<u>Mathematica</u>	Yes ^[38]	Yes	Yes	Yes	Yes	Yes ^[39]	<u>Java</u> , <u>.NET</u> , <u>C++</u> , <u>Fortran</u> , <u>CUDA</u> , <u>OpenCL</u> , <u>R</u> , <u>Python</u> , <u>SQL</u> , <u>SPARQL</u> , <u>NodeJS</u>	<u>Java</u> , <u>.NET</u> , <u>C++</u> , <u>Python</u> <u>Excel</u> , ^[40] <u>LabVIEW</u> ^[41] <u>Haskell</u> , ^[42] <u>AppleScript</u> , ^[43] <u>Racket</u> , ^[44] <u>Visual Basic</u> , ^[45] <u>Clojure</u> , ^[46] <u>MATLAB</u> ^[47]
<u>MATLAB</u>	with extension ^[48]	with extension library ^[49]	Yes ^[50]	Yes	Yes	Yes ^[51]	Through MEX ^[52] files: <u>C</u> , <u>C++</u> , <u>Fortran</u> . Also compiled <u>Java</u> and <u>ActiveX</u> components. <u>Mathematica</u> ^[47]	<u>.NET</u> , ^[53] <u>Java</u> , ^[54] <u>Excel</u> ^[55]
<u>MLAB</u>	No	Yes	No	Yes	Yes	No	No	No
<u>PDL</u>	Yes ^[56]	No	Yes ^[57]	Yes ^[58]	Yes	Yes ^[59]	<u>C</u> via perlXS; <u>C</u> , <u>Python</u> , <u>F77</u> , etc. via Inline	<u>Perl</u> , <u>C</u> ^[60]
<u>R</u>	No	Yes and extended via Ryacas package	Yes ^[61]	Via the tcltk library	Yes	Yes ^[62]	<u>C</u> , <u>C++</u> , <u>Fortran</u> ^[63] <u>MATLAB</u> ^[64] <u>Python</u> ^[65]	<u>Excel</u> , ^[66] <u>Python</u> , ^[67] <u>SAS</u> ^[68]
<u>SageMath</u>	No	Yes	Yes	No	Yes	Yes ^[69]	Many languages ^[70] ^[71] ^[72]	Yes (any language that can call Python)
<u>SAS</u>	No	No	DS2 and SCL	Yes	No	No	<u>C</u> , <u>Java</u> <u>R</u> (requires IML)	No

	<u>Standalone executables creation support</u>	<u>Symbolic computation support</u>	<u>OOP support</u>	<u>GUI creation support</u>	<u>Multi-dimensional arrays as primitive data type</u>	<u>Centralized extension library website</u>	<u>Can call code in other languages</u>	<u>Can be called from other languages</u>
<u>TK Solver</u>	with extension	No	Yes	with extension	Yes	Yes	<u>.NET Excel</u>	Unknown

Libraries

General

	<u>Creator</u>	<u>Language</u>	<u>First public release</u>	<u>Latest stable version</u>	<u>Cost (USD)</u>	<u>License</u>	<u>Notes</u>
<u>ALGLIB</u>	Sergey Bochkkanov	C++, C#, FreePascal	2006	3.12.0 / August 2017	Dual licensed	GPL/commercial	General purpose numerical analysis library. Cross-platform (Windows, *nix).
<u>Armadillo</u>	<u>NICTA</u>	C++	2009	3.900 / 2013	Free	<u>MPL</u>	C++ template library for linear algebra; includes various decompositions and factorisations; syntax (API) is similar to <u>MATLAB</u> .
<u>GNU Scientific Library</u>	GNU Project	C	1996	2.5 / 14 June 2018	Free	<u>GPL</u>	General purpose numerical analysis library. Targets GNU/Linux, can be built on almost any *nix OS with Ansi C compiler.
<u>ILNumerics</u>	H. Kutschbach	C#, PowerShell	2007	1.3.14 / August 2008	Non-free	Proprietary	aims .Net/mono, 2D/3D plottings (beta)
<u>IMSL Numerical Libraries</u>	<u>Rogue Wave Software</u>	C, Java, C#, Fortran, Python	1970	many components	Not free	Proprietary	General purpose numerical analysis library.
<u>Math.NET Numerics</u>	C. Rüegg, M. Cuda, et al.	C#, F#, C, PowerShell	2009	4.7.0 / November 2018	Free	<u>MIT/X11</u>	General purpose numerical analysis and statistics library for the <u>.NET Framework</u> and <u>Mono</u> , with optional support for native providers.
<u>NAG Numerical Library</u>	The Numerical Algorithms Group	C, Fortran	1971	many components	Not free	Proprietary	General purpose numerical analysis library.
<u>NMath</u>	<u>CenterSpace Software</u>	C#	2003	6.2 / March 2016	\$995	Proprietary	Math and statistical libraries for the <u>.NET Framework</u>
<u>SciPy</u>	scipy.org community	Python	2001	1.3.1 / 9 August 2019	Free	<u>BSD</u>	Adds numerical programming capabilities to the <u>Python programming language</u> . Related to <u>NumPy</u> , and therefore connected to the previous Numeric and Numarray packages for Python

Operating-system support

The operating systems the software can run on natively (without emulation).

	<u>Windows</u>	<u>macOS</u>	<u>Linux</u>	<u>BSD</u>	<u>Unix</u>	<u>DOS</u>	<u>Android</u>
<u>ALGLIB</u>	Yes	Yes	Yes	Yes	Yes	No	Yes
<u>GNU Scientific Library</u>	Yes	Yes	Yes	Yes	Yes	No	Yes
<u>ILNumerics</u>	Yes	Yes	Yes	Yes	Yes	No	No
<u>IMSL Numerical Libraries</u>	Yes	Yes	Yes	No	Yes	No	No
<u>Math.NET Numerics</u>	Yes	Yes	Yes	Yes	Yes	No	No
<u>NAG Numerical Library</u>	Yes	Yes	Yes	No	Yes	Yes	No
<u>NMath</u>	Yes	No	No	No	No	No	No
<u>SciPy (Python packages)</u>	Yes	Yes	Yes	Yes	Yes	Yes	No

See also

- Comparison of computer algebra systems
- Comparison of deep-learning software
- Comparison of statistical packages

- [List of numerical-analysis software](#)

Footnotes

1. Julia allows direct calls of C functions (no wrappers needed). Designed for cloud parallel computing with LLVM JIT as a backend. Lightweight "green" threading (coroutines). Efficient support for Unicode. Shell-like capabilities for managing other processes. Lisp-like macros and other metaprogramming facilities.
2. Capabilities of PSPP include analysis of sampled data, frequencies, cross-tabs comparison of means (t-tests and one-way ANOVA); linear regression, logistic regression, reliability (Cronbach's Alpha, not failure or Weibull), and re-ordering data, non-parametric tests, factor analysis, cluster analysis, principal components analysis, chi-square analysis and more.
3. SequenceL delivers high performance on multicore hardware with ease of programming, and code clarity/readability. Designed to work with other languages, including C, C++, C#, Java, Fortran, Python, etc. Can be compiled to multithreaded C++ (and optionally OpenCL) code with no explicit indications from the programmer of how or what to parallelize. A platform-specific runtime manages the threads safely.
4. Once was supported

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