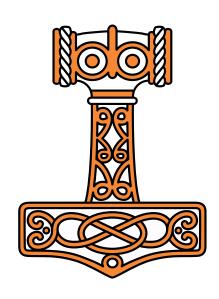


Olhão 2022

Growing APLers

Rich Park



apl.chat dyalog.tv APL Seeds '23 APL Farm on Discord /r/apljk arraycast.com stackoverflow.com YouTube: Dyalog Ltd. forums.dyalog.com **Dyalog Usermeeting** Adam's APL tutorial.dyalog.com mastering.dyalog.com RikedyP course.dyalog.com Jeremy Howard xpqz.github.io/learnapl code report apl.news mooc.fi apl.wiki dyalog.com/getting-started.htm

Getting Started

Getting started with any new programming language can seem like a daunting task, and the Dyalog application development platform ships with enough features that you might appreciate some guidance to help you get started. The resources on this page are free of charge and aimed at APL novices.



APL Seeds: Events aimed at those who are just starting their APL journey. APL Seeds '23 will be held in spring 2023.



Download materials/watch recordings from: APL Seeds '21 APL Seeds '22

Community

APL has a thriving and enthusiastic community of users who are very happy to answer questions:

- Chat in the APL Orchard, a very active chat room
- · Ask a question on Stack Overflow or the r/aplik subreddit
- Post in the Dyalog Forums
- Dyalog social media: Twitter, Facebook, LinkedIn

Basics

Resources to help you take your first APL steps:

- Tips is a page of "useful to know" suggestions from previous beginners.
- Videos: Dyalog Basics is a library of introductory videos.
- <u>Mastering Dyalog APL</u> by Bernard Legrand is a complete guide to the use of Dyalog, beginning with a thorough
 introduction to the APL programming language and progressing to worked examples. The book is available for purchase
 through <u>Amazon</u>; a <u>free PDF download</u> and an <u>online revision</u> (currently under development) are also available.
- <u>TryAPL</u> offers an interactive environment that allows users to play with simple APL expressions. Its <u>Learn tab</u> includes tutorials in which various scenarios are explored.
- · APL Wiki includes simple examples of APL in action (as well as some more advanced ones).
- <u>APL Cultivation</u> is a series of chat lessons that were run through the <u>APL Orchard</u> chat room.
- APL Course is a self-study introduction to Dyalog with exercises.
- <u>APL Tutor</u> is an online system that takes a complete novice through the terminology, conventions and functionality of APL (not specific to Dyalog's dialect) – it looks a little dated but is a useful introduction.



DVALOC



Webinar APL Seeds '22 Dyalog '21 APL Seeds '21 Dyalog '20 Dyalog '19 Dyalog '18 Dyalog '17 Dyalog '16 Dyalog '15 Dyalog '14 Dyalog '13 Dyalog '12

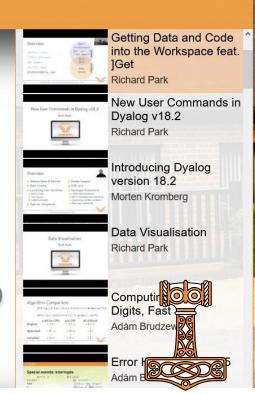
Dyalog '11 APL Berlin 2010 Dyalog '09 Dyalog '08

Getting Data and Code into the Workspace feat JGet - Dyalog Webinar with Rich Park
Getting Data and Code

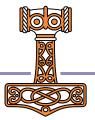
into the Workspace feat.] Get

Rich Park



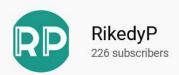












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65 views • Streamed 2 weeks ago

4 more APL solutions in 24 minutes!

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Overview: Computational complexity in APL

2.1K views • 1 year ago











Four Features of Modern APL

PWC: Hash-counting String in APL

PWC: Rare Numbers in APL

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Loopless Snail Sort

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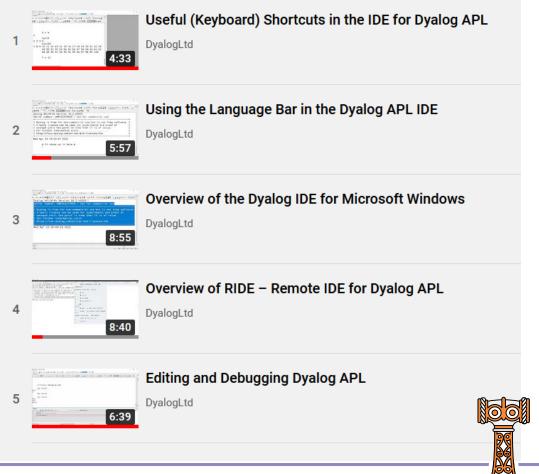
Perl Weekly Challenge in (and BQN)

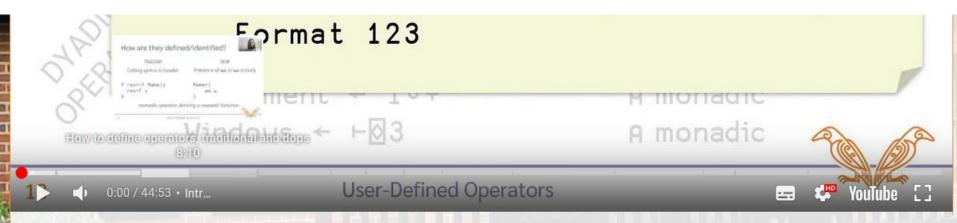


Programming Environment Basics

5 videos • 155 views • Last updated on 16 May 2022







Adám Brudzewsky

APL operators (higher-order functions) offer powerful ways to apply functions to data. While Dyalog provides plenty of powerful operators, you can define your own to accomplish additional tasks. In this webinar, we show the basic syntax of user-defined operators and present a few utilities, compositions, and conceptual tools.

00:00 Introduction

01:42 What is an operator? Operator and derived function valence



The APL Jot Dot Times

CHALLENGE

POINTFREE MATHEMATICS IDIOM DESIGN

COMMENTARY

ANNOUNCEMENT EXAMPLE ANECDOTE

Some balanced binary trees in APL

2022-10-03, Raghu Ranganathan

EXAMPLE

Futhark on The Array Cast

2022-10-03, Troels Henriksen

COMMENTARY

Threading the HTMLRenderer

2022-09-22, Paul Mansour

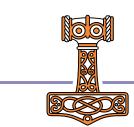
EXAMPLE

A Document Object Model in APL

2022-09-21, Paul Mansour

EXAMPLE; DESIGN

apl.news



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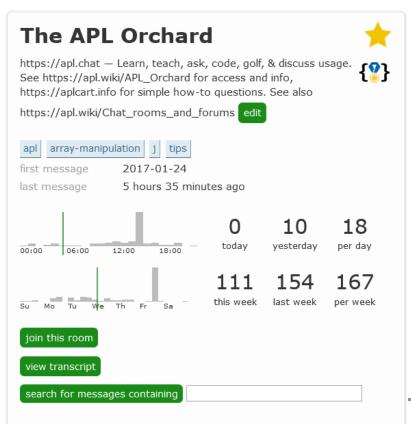
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faq

The APL Orchard

general

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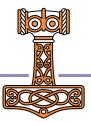
The APL Farm on



discord.gg/cYbMMw5D

reddit.com/r/apljk

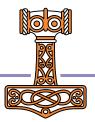




APL Seeds '23

- Spring 2023
- New and prospective APL users
- What is your APL story? We'd love to hear
- aplseeds@dyalog.com







Why APL is a language worth knowing by Rodrigo Girão Serrão #FnConf 2022

726 views • 31 Mar 2022









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APL New York Meetup (In Person)



Hosted By Conor H. and 2 others





Programming Languages Virtual Meetup

- Wednesday, September 7, 2022 at 6:00 PM to Wednesday, September 7, 2022 at 8:00 PM EDT Add to calendar
- WeWork Office Space & Coworking 750 Lexington Ave · New York, NY How to find us 750 Lexington Ave, 12th Floor. Someone will be waiting to let you in at the 12th floor.

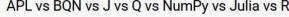
WED, SEP 7 · 11:00 PM BST APL New York Meetup (In Person)



Past event





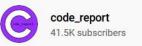


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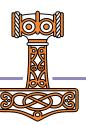
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FinnAPL spring meeting

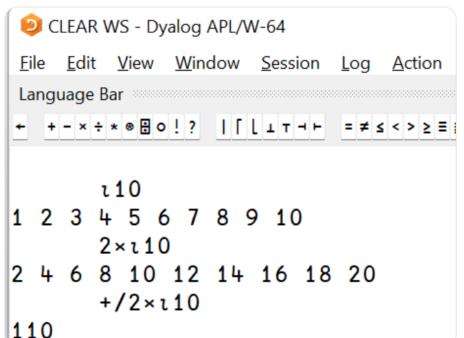
APL Germany spring meeting







Change of plan. We switched to using @dyalogapl APL for learning sequences and series in our math lesson, and the kid's like it *so* much better than Python list comprehensions!





fast.ai APL Study Group

fast.ai APL study session 1

5,907 views • 5 Jul 2022

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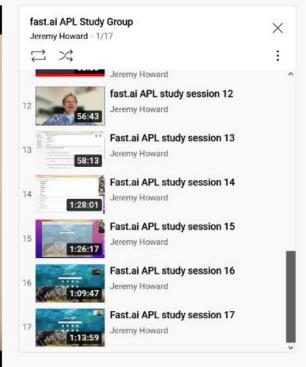


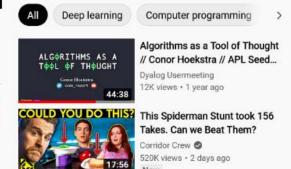
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All are welcome to join our APL study group! Details here: https://forums.fast.ai/t/apl-array-pr... Discuss this session here: https://forums.fast.ai/t/apl-study-se...





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Add a comment...



Adám's APL 3 months ago (edited)

17:45 - Turn off the docked windows by default through saving your session via the menu: Session > Save

15:55 - Remove the word "Language Bar": Right-click on the Language Bar > Hide Caption

32:50 - Turn boxing on permanently by saving your session, as described above

40:20 - Real backticks with the in-browser language bar: Backtick, Space

50 REPLY 四 9



shunya shanti 3 months ago

Thank you Jeremy for your work(democratising education) I just came across fastchan and i thank u agn for it. Made the environment setup and dependency installation much less nightmarish

50 REPLY



Ken Chang 3 months ago

OMG, APL! I got exposed to it back in the early 70's along with BASIC. I enjoyed APL **

50 REPLY



aeamaea 3 months ago

Apparently Ken Iverson used the "Iverson Notation" (later to become APL) to create the formal spec for IBM's 360 mainframe CPU.

50 REPLY

Joe Kanaan 3 months ago



Hi Jeremy! When will the part 2 of the tutorial be released?



Corridor Crew @ 520K views · 2 days ago



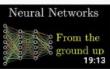
You're Unique, Just Like Everyone Else (APL Quest... Adám's APL

88 views . 5 days ago



I Cycled 750km Across Japan in a Week | Ft. @CDawgVA

Abroad in Japan ② 677K views · 2 days ago



3BLUE1BROWN SERIES S3 E1

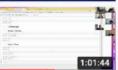
But what is a neural network? | Chapter 1, Deep learning

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fast.ai APL study session 2

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DigitalSreeni 2.5K views • 11 months ago



Lesson 1 - Deep Learning for Coders (2020)

Jeremy Howard

315K views • 2 years ago

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Conference has concluded! Check back in 2023!

Apply for the 2023 team here!

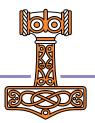
esolangconf.com

Our Mission

The high school computer science curriculum is entrenched in old, boring programming languages. Students have no idea of the diversity of programming paradigms out there: from functional, to array-based, to knowledge-based programming. Most have never even heard of pattern matching, macros, or higher-order functions! We want to change this.



Teaching APL



About

First Steps

Dfns and Assignment

Selecting from Lists

The Outer Product

Shape Reshape

The Array Model Search, Sort and Select

Loops and Recursion

Extra Assignment

Workspace Basics Namespaces and Other Objects

Getting Help

User-defined Functions

Operators **Ouad Names**

Error Handling and Debugging

Data IO

Code IO

External Interfaces

Historical Quirks

Interpreter Internals

Further Reading

API Course

A self-study introduction to Dyalog APL with exercises.

This course consists of a series of short instructional notes interleaved with problem sets. The first few sessions are accompanied by video tutorials.

Status

The course is undergoing changes in structure and content. We do not currently recommend linking to specific pages or sections at the current time, as those links are likely to break in future updates.

Getting Started

If you're just starting out, you can use the TryAPL online interpreter. Put TryAPL on one half of your screen, and view the course on the other half.

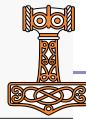
If you need help typing APL glyphs (e.g. ×+1) then see the APL Wiki.

Audience

This course assumes high-school / secondary level mathematics knowledge, and some familiarity with basic programming terminology (e.g. function, variable, recursion). It is not currently intended as a general introduction to programming, but more of a fast-track to getting **Getting Started**

Audience

Feedback



About

First Steps

Dfns and Assignment

Selecting from Lists

The Outer Product

Shape Reshape

The Array Model

Search, Sort and Select

API Course

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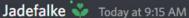
Audience

Feedback





@Adám If you just want some basics, check out https://course.dyalog.com/ which isn't ready yet, but already tackles the basics.



The first page was rather easy, managed to solve everything



Operators

Ouad Names

Error Handling and Debugging

Data IO

Code IO

External Interfaces

Historical Quirks

Interpreter Internals

Further Reading

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x (+/ ×°−1)°1 2 ⊢y Learning APL

Q Search this book...

Introduction

It's arrays all the way down

Indexing

Glyphiary

Direct functions and operators

Iteration

The Key operator: ■

The At operator: @

The Rank/Atop operator: 6

The Stencil operator:

The Över operator: ö

Dyadic transpose: A&B

Encode decode: TI

Products

Trainspotting

Finding things

Partitions

Error handling

The APL Way

Namespaces Ins





A language that doesn't affect the way you think about programming is not worth knowing. —Alan Perlis

Who is this for?

I wrote this to be the book I would have wanted to read when I started to learn APL. An introduction to APL for an experienced practitioner from a different programming language or two. We all learn in different ways, and I prefer the fundamental concepts laid bare first, and then learn by example.

I came to APL after discovering a file of solutions to the Advent of Code 2015 challenge in K, an APL derivative. That's around 100 lines of actual code, and whilst I didn't understand any of it, I kept looking at it, trying to figure out which of the 50 problems (well, 49) this was a solution to. Each of my Python solutions typically ran to 50-100 lines+ for the bulk of the problems.

Turns out it was the whole lot. That blew my mind.

What is APL?

APL is an array language, and one of the oldest programming languages still in use today, next to FORTRAN, Lisp and COBOL. APL uses its own curious-looking symbols, like ***[**o=***0**, rather than reserved words written out in English like most other languages, like C or Python. As a language, APL sits at a very high level of abstraction, making it well suited to ultra-concise formulations of algorithms.



Who is this for?

What is API?

Why should I learn APL?

...but it's unreadable!

Don't I need a lot of mathematics?

A note on our APL subset

Is terser better?

Other resources

Ok, I'm convinced, how do I get started?

Our first tentative steps

Valence



Mastering Dyalog APL

Q Search this book...

- 1. Introduction Will You Play APL With Me?
- 2. Getting Started
- 3. Data and Variables
- 4. Some Primitive Functions
- 5. User-Defined Functions
- 6. First-Aid Kit
- 7. Execute & Format Control
- 8. Working on Data Shape
- 9. Special Syntax
- 10. Nested Arrays (Continued)
- 11. Operators
- 12. Appendices

Powered by Jupyter Book







Mastering Dyalog APL

The "Mastering Dyalog APL" book is the de facto standard for people who are looking to learn Dyalog APL from a book. In today's world technology changes rapidly, so a printed book about a programming language is at risk of becoming outdated.

Open tention

 \equiv

This online version is a work in progress. It is missing chapters and sections and the content here may undergo heavy revision.

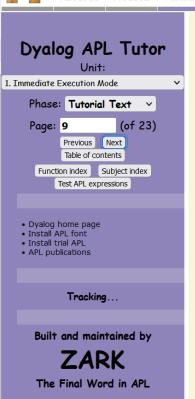
Feel free to open a new issue on GitHub if you would like to give feedback or to suggest corrections to any eventual mistakes/typos you encounter. Alternatively, you can send an email to mdapl@dyalog.com.

The first edition of "Mastering Dyalog APL" is an excellent resource but is becoming more and more outdated as the years go by and Dyalog APL evolves. For that matter, an updated and more modern version of the book is being created out of Jupyter Notebooks (available in this GitHub repository) to provide for a more interactive learning experience for those who like to read and experiment. A static online version also exists, and a printed version will be made available for those of you who prefer to hold a paper book in their hands.

The first edition dates back to November of 2009 and was written by Bernard Legrand, with most grateful acknowledgements to the contributors:

- Kim S. Andreasen
- Daniel Baronet





"What do we do?" asked one creator.

"Let's redesign the keyboard," suggested a second.

"You're out of your mind!" shouted a third. "No one will use APL if you need a special keyboard. Where would you get it?"

"Relax," said the second. "All we have to do is make some minor modifications to a regular keyboard. First, we can replace the keytops with new ones that have our symbols on them. Or, in a pinch, we can provide little stickers people can stick to the top side or front side of the keys.

Creator 2

"Second, we can rip out whatever mechanism displays the normal symbols, and replace it by a mechanism that displays our symbols."



▼ Table of Contents



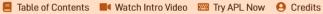
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- 1. Immediate Execution Mode
- 2. Variables
- 3. Scalars and Vectors
- 4. Number Manipulation Functions
- 5. Order of Execution
- 6. Monadic Number Manipulation Functions
- 7. Vector Generating Functions
- 8. Matrices
- 9. Character Data
- 10 Shane and Dank

- 13. Selection
- 14. Reductions
- 15. Scans
- 16. Searching 17. Programming
- 18. User-Defined Functions
- 19. Workspace Management
- 20. Branching and Looping
- 21. Control Structures
- 22. Debugging
- 23 Writing Interactive Functions

- 26. Files
- 27. Shuffling Data
- 28. Inner and Outer Products
- 29. Advanced Numerical Functions
- 30. Workspace Storage
- 31. Full Screen Input
- 32. Readability
- 33. Exception Handling
- 34. Efficiency
- 35. Boolean Techniques
- 34 File Decian







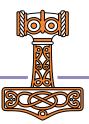








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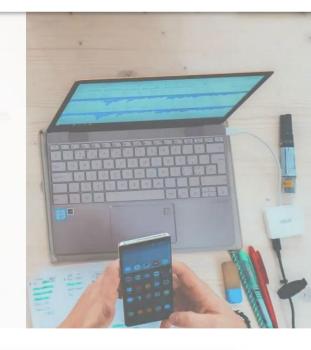




High-quality, open and free courses for everyone!

The courses are hosted by University of Helsinki MOOC Center. No prior knowledge is required — beginners can start to learn programming basics from the Programming with Java course, or start to get familiar with artificial intelligence from the course Elements of Al.

Our courses



Help the victims of the war in Ukraine.

Support students and researchers affected by the invasion of Ukraine

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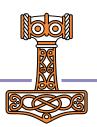


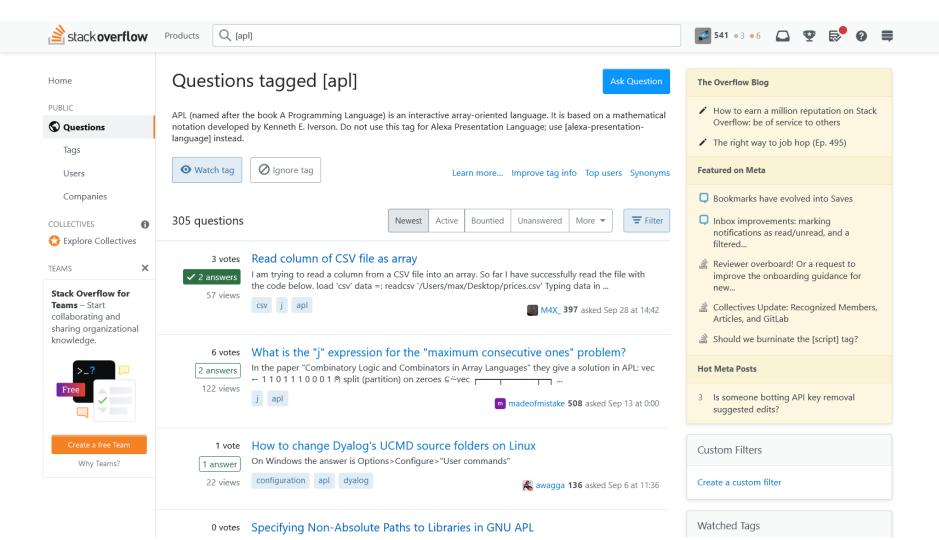
"Libraries are super useful but I am fascinated that APL has sort of them come this far without having a huge package repository which everyone uses I think it's really interesting that if when solving something in APL the first thing you do is not go search on the internet for some ready-made solution but actually looking at the problem and saying can I do this myself and usually you can"

- Alve Björk - Young APLers' Panel, Dyalog '19



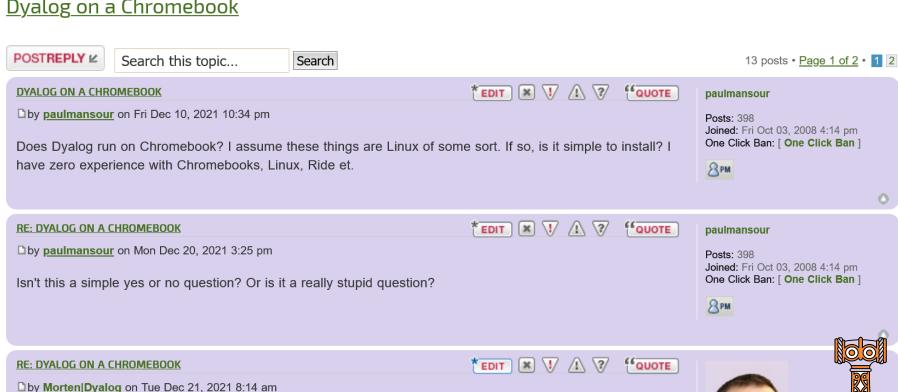
Get ans fastly





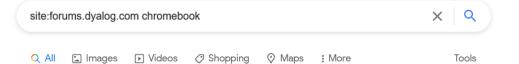
Moderator Control Panel]

<u>Dyalog on a Chromebook</u>



Hi Paul, sorry for the slow response. I believe the simple answer is "Yes", at least the TTY version starts and runs in the "Linux Ann". Geoff did the testing a while ago and I wanted to ask him about whether he got RIDE





About 0 results (0.21 seconds)

Your search - site:forums.dyalog.com chromebook - did not match any documents.

Suggestions:

- · Make sure that all words are spelled correctly.
- Try different keywords.
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site:forums.dyalog.com chromebook















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.0.20000E-0020.15347E+0000.14970E+000 .0.30317E+000 .0.20687E-0020.5533E-0020.0000E+0000.000E+0000.	-002 · · · · 2 · · · 0 · · · 0. 23294E-013 · · 0. 00000E+000 · · 0. 3221E-003 · · 0. 00000E+000 · · · 0. 3221E-015 · · 0. 0000E+000 · · · 0. 00000E+000 · · · 0. 00000E+000 · · · 0. 00000E+000 · · 0. 0000E+000 · 0. 000E+000 · 0. 000E+0	00000E+0000.00000E+0000.00000E+000
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.0,0000E-0020,40042E+0000,4490E+0000,9005E+000 .0,0202E-0020,1000E-0010 0.0000E+0000,0000E+000 .0,0000E+000 .0,0000E+0000,0000E+0000,0000E+000	-001 · · · · · 2 · · · · 0 · · · 0 · 81221E -004 · 0 · 0000E +000 · · 0 · 39211E -003 · · 0 · 0000E +000 · · 0 · 0000E +000 · · 0 · 0000E +000 · · 0 · 0000E +000 · 0 · 0000E +000 · 0 · 0000E +000 · · 0 · 0000E +000 · 0 · 0000E +000 · · 0 · 0000E +000 · 0 · 0000E +000 · · 0 · 0000E +000 · 0 · 0 · 0000E	00000E+0000.00000E+0000.00000E+000
0.80000E-0020.61386E+0000.59875E+000 .0.12126E+001 .0.82699E-0020.26227E-0010.82699E+0000.82699E+0000.8269E+0000.8269E+0000.8269E+0000.8269E+0000.8269E+0000.8269E+0000.8269E	:-001 · · · · · · 7 · · · 12 · · · · · 0.16532E-003 · · 0.00000E+000 · · 0.39211E-003 · · 0.0000E+000 · · · 0.0000E+000 · · · 0.0000E+000 · · · 0.0000E+000 · · · 0.3921E-005 · · 0.17767E-005 · · 0.17767E-005 · · 0.17767E-005 · · 0.17767E-005 · · 0.0000E+000 · 0.000E+000 · 0.0000E+000 · 0.0000E+	0000000-000 -0.000000-000 -0.000000-000
.0.10000E-0010.76499E+0000.74601E+0000.15109E+001 .0.10293E-0010.32746E-001 0.64097E-007 0.97144E+0000.93834E+000 65892E+000 0.10099E+001 55608E+000	-001 · · · · 17 · · · 21 · · · · 0.47005E-004 · · 0.93302E-003 · · 0.39211E-003 · · · 0.77217E-003 · · · · 0.84055E-002 · · 0.10296E-003 · · · - 0.16255E-004 · · · 0.32766E-004 · · · 0.97478E-007 · · · 0.11511E-005 · · · 0.64087E-007 · · · · 0.16255E-004 · · · 0.16512E-004 · · · 0.	
.0.12000E-0010.87999E-0000.85730E+0000.17373E+001 .0.11782E-0010.38893E-0010.0.26256E-0040.11340E+0010.10903E+0010.7509E+000 .0.11821E+0010.64735E+0000	:-001 · · · · · 24 · · · · 25 · · · · · 0.30628E-004 · · 0.69335E-004 · · 0.29535E-004 · · 0.29535E-004 · · 0.86951E-003 · · · 0.14021E+000 · · 0.17351E-002 · · · - 0.26767E-003 · · 0.53064E-003 · · 0.53064E-003 · · 0.1753E-004 · · 0.1753E-004 · · 0.1068E-005 · · · 0.2684E-003 · · 0.26708E-003	51734E-003 - 0.51818E-004 - 0.30927E-004
0.14000E-001 · · ·-0.92867E+000 · ·0.9298E+000 · ·0.18316E+001 · ·0.12292E-001 · ·0.43981E-001 · ·0.43981E-0	-001 · · · · 19 · · · 19 · · · 19 · · · 0.41389E-004 · · 0.60933E-003 · · 0.15834E-003 · · 0.15834E-003 · · 0.49851E+000 · · 0.62810E-002 · · · 0.95172E-003 · · 0.9578E-003 · · 0.19175E-002 · · 0.70531E-006 · · 0.57350E-004 · · 0.37679E-005 · · · 0.93806E-003 · · 0.88355E-003 · · 0.	15447E-002 - 0.86374E-003 - 0.45760E-003
.0.15988E-0010.94871E-0000.92020E+000 -0.18098E+001 -0.12848E-0010.48157E-0010.69474E+000 -0.15453E-0020.12160E+001 -0.11673E+001 -0.81223E+000 -0.12668E+001 -0.69474E+000 -0.	-00114140, 9,493E-004 .0.87697E-003 .0.87296E-004 .0.87697E-0030.87296E-004 .0.27467E-0030.9589E4000 .0.12546E-0010.1823E-0020.1898E-002 .0.36719E-0020.1098E-005 .0.1013E-0030.7373E-0030.17731E-0020.1558E-0020.	23472E-0020.30747E-0020.16280E-002
0.1808eF-001 · · · · 0.90191E+000 · · 0.33955E+000 · · 0.18929E+001 · · 0.12301E-001 · · 0.5174EE-001 · · 0.2591E-002 · · · 0.12301E-001 · · 0.5174EE-001 · · 0.2591E-002 · · · 0.12301E-001 · · 0.76551E+000 · · 0.2591E-002 · · · · 0.12301E-001 · · 0.76551E+000 · · 0.2591E-002 · · · · 0.76551E+000 · · 0.2591E-001 · · 0.76551E+000 · · 0.2591E-001 · · 0.76551E+000 · · 0.2591E-001 · · · 0.76551E+000 · · 0.2591E-001 · · · 0.76551E+000 · · · 0.2591E-001 · · · 0.2	-001 · · · · 12 · · · 12 · · · 0.57515E-004 · · 0.63320E-003 · · 0.11271E-003 · · 0.98562E-004 · · · 0.14345E+001 · · 0.10776E-001 · · · - 0.27393E-002 · · 0.55150E-002 · · 0.55150E-005 · · 0.14129E-003 · · 0.11376E-004 · · · 0.28704E-002 · · 0.28183E-002 · · 0.	29792E-002 - 0.58951E-002 - 0.31217E-002
-0.20000E-001 ··-0.97347E+000 ·-0.94018E+000 ·-0.1936E+001 ·-0.12320E-001 ·-0.54893E-001 ·-0. 0.44423E-002 ··-0.12425E+001 ·-0.1918E+001 ·-0.82769E+000 ·0.12906E+001 ·-0.7489E+000 ·-0.	[-001 · · · · · 9 · · · 12 · · · · 0.73021E-003 · · 0.10730E-003 · · 0.11840E-003 · · 0.49965E-003 · · · 0.49965E-002 · · 0.27798E-001 · · · · 0.27798E-002 · · 0.37133E-002 · · 0.73798E-005 · · 0.17630E-003 · · 0.15491E-004 · · · · 0.43169E-002 · · 0.4362E-002 · · 0.	35713E-0020.88616E-0020.46941E-002
.0.72000E-0010.98450E-0000.94904E+0000.19335E+001 .0.12280E-0010.57678E-0010.59426E-0020.12532E+001 .0.12020E+001 .0.83446E+000 .0.12999E+001 .0.72405E+000	-001 · · · · · 0 · · 12 · · · · 0 · 97643E -003 · · 0 · 93627E -003 · · 0 · 11963E -003 · · 0 · 69638E -003 · · · · · 69638E -001 · · · · 0 · . 35580E -001 · · · - 0 · . 45974E -002 · · · 0 · . 47819E -000 · · · 0 · 20681E -003 · · · 0 · 19622E -004 · · · · 0 · . 57841E -002 · · 0 · . 5774E -002 · · 0 · .	42037E-002 - 0.11867E-001 - 0.62894E-002
.0.24006E-0010.99509E-0000.95771E+0000.19528E+001 .0.12215E-0010.00141E-0010.74475E-0020.12028E+0010.12114E+0010.84105E+0000.13079E+0010.73285E+0000	:-001 · · · · · · 9 · · · · 9 · · · · 0, 19959E-003 · · 0, 79022E-003 · · 0, 11989E-003 · · 0, 11989E-003 · · 0, 85733E-003 · · · 0, 2958E+001 · · 0, 46119E-001 · · · -0, 55295E-002 · · 0, 11124E-001 · · 0, 43112E-006 · · 0, 23340E-003 · · 0, 23766E-004 · · · 0, 72596E-002 · · 0, 71179E-002 · · 0,	52624E-002 - 0.14886E-001 - 0.78943E-002
.0.26000E-0010.10055E-0010.96630E+0000.19718E+001 .0.12133E-0010.62344E-0010.89540E-0020.12733E-001 .0.12237E-0010.89540E-0020.12733E-001 .0.74156E-0000.89540E-0020.12733E-0010.74156E-0000.89540E-0020.12733E-0010.12836E-0010.84763E-0000.13156E+0010.74156E-0000.89540E-0020.12733E-0010.12733E-0010.12733E-0010.12733E-0010.12836E-0010.84763E-0000.13156E-0010.12836E-001	-001 · · · · · 9 · · · · 0. 20444E -003 · · 0.83153E -003 · · 0.11987E -003 · · 0.86925E -003 · · · 0.33848E +001 · · · 0.56432E -001 · · · - 0.6452E -002 · · 0.12999E -001 · · 0.15846E -005 · · 0.2568E -003 · · 0.27879E -004 · · · 0.8737E -002 · · 0.85664E -002 · · 0.	63201E-002 0.17911E-001 0.95050E-002
.0.28000E-001 ··-0.10150E+001 ·-0.97478E+000 ··0.1904E+001 ·0.1204E-001 ·-0.6323E-001 ·-0.01462E-001 ··0.12016E+001 ·0.12298E+001 ·0.85418E+000 ·0.13230E+001 ·0.75016E+000 ·0.	-001 · · · · · 9 · · · · 0. 20947E-003 · · 0. 87164E-003 · · 0. 11989E-003 · · 0. 87932E-003 · · · 0. 38747E+001 · · 0. 67529E-001 · · · -0. 73974E-002 · · 0. 74785E-002 · · 0. 14876E-001 · · 0. 29595E-005 · · 0. 27712E-003 · · 0. 31935E-004 · · · · 0. 10224E-001 · · 0. 10019E-001 · · 0.	73765E-0020.20942E-0010.11122E-001
0.104021-0010.12810-001 - 0.128101-000 - 0.83101-000 - 0.8312201-001 - 0.73101-000 - 0.831201-001 - 0.83101-000 - 0.83101-001 - 0.83101-00	-001 · · · · · 9 · · · · 0. 21410E -003 · · 0. 90641E -003 · · 0. 11994E -003 · · 0. 18676E -003 · · · 0. 43654E +001 · · · 0. 79418E -001 · · · - 0. 83333E -002 · - 0. 84217E -002 · · 0. 16755E -001 · · 0. 45356E -005 · · 0. 29515E -003 · · 0. 35911E -004 · · · · 0. 11713E -001 · · 0. 11475E -001 · · 0.	84318E-002 - 0.23977E-001 - 0.12744E-001
0.13472-001 0.12902-001 - 0.13436-000 - 0.202086-001 - 0.134290-001 - 0.78502-000 - 0. - 0.320006-001 0.103536-001 - 0.901436-000 - 0.202086-001 - 0.118426-001 - 0.677336-001 - 0. - 0.13486-001 0.129226-001 - 0.12476-001 - 0.867186-000 - 0.133646-001 - 0.767016-000 - 0.	-001 · · · · · 0 · · · · 0 · · · · 0 · · · 0 · · · 0 · · · 0 · 21886 - 003 · · 0 · 03053 - 003 · 0 · 12001 - 003 · · 0 · 80126 - 002 · · · 0 · 48570 - 001 · · 0 · · 0 · 92106 - 001 · · · 0 · 03057 - 002 · · · 0 · 18636 - 001 · · · 0 · 62050 - 005 · · · 0 · 31110 - 003 · · · 0 · 30705 - 004 · · · · · 0 · 13206 - 001 · · · 0 · · 0 · 0 · 0 · 0 · 0 · 0 ·	94861E-002 0.27017E-001 0.14372E-001
0.134941-001 · · · 0.12992-001 · · 0.124/41-001 · · 0.80/181-000 · · 0.1343041-001 · · 0.7011-000 · · 0. · 0.34000E-001 · · · 0.10449E+001 · · 0.99957E+000 · · 0.20445E+001 · · 0.11729E-001 · · 0.69213E-001 · · 0.14997E-001 · · · 0.13420E+001 · · 0.77525E+000 · · 0.14997E-001 · · · 0.13420E+001 · · 0.77525E+000 · · 0.0000 · 0.0000 · 0.00000 · 0.00000000	[-001 · · · · · 9 · · · · 0. 22336E-003 · · 0. 3575E-003 · · 0. 12008E-003 · · 0. 12008E-003 · · 0. 89374E-003 · · · 0. 53493E+001 · · 0. 10560E+000 · · · - 0. 10209E-001 · · 0. 20519E-001 · · 0. 20519E-005 · · 0. 32528E-003 · · 0. 43575E-004 · · · · 0. 14704E-001 · · 0. 14400E-001 · · 0.	10539E-001 0.30062E-001 0.16006E-001
-0.1009/E-0010.100/06-0010.100/06-0010.200106-0010.11009E-0010.7002E-0010.0000000000000000000000000000000	-001 · · · · · 9 · · · 9 · · · 0.22734E-003 · · 0.9270E-003 · · 0.12017E-003 · · 0.89457E-003 · · · 0.58425E+001 · · 0.11990E+000 · · · 0.11148E-001 · · 0.11256E-001 · · 0.22404E-001 · · 0.10304E-004 · · 0.3793E-003 · · 0.4724E-004 · · · 0.16205E-001 · · 0.15868E-001 · · 0.	11592E-001 0.33109E-001 0.17645E-001
0.18029E-001 · · · 0.13228E+001 · · 0.12715E+001 · · 0.2078E+001 · · 0.13729E+001 · · 0.7309E+001 · · 0.7309E+	-001 · · · · · 9 · · · · 0.5990E-003 · · 0.5200E-003 · · 0.1207E-003 · · 0.4010E-003 · · · 0.5365E+001 · · 0.13502E+000 · · · -0.12089E-001 · · 0.24291E-001 · · 0.24291E-004 · · · 0.34922E-003 · · 0.50785E-004 · · · 0.17710E-001 · · 0.17340E-001 · · 0.	12643E-001 0.36160E-001 0.19290E-001
-0.40000E-001 · · · 0.1325E-001 · · 0.1233E-001 · · 0.2057E+001 · · 0.1335E-001 · · 0.7950E-001 · · 0.0000E-000 · · 0.1335E-001 · · 0.7950E-001 · · 0.1335E-001 · · 0.7950E-001 · · 0.1350E-001 · · 0.1350E-00	-001 · · · · · 9 · · · 9 · · · 9 · · · 0.60370E-003 · · 0.52421E-003 · · 0.12036E-003 · · 0.3934E-003 · · 0.6931E+001 · · 0.15095E+000 · · -0.13030E-001 · · 0.26180E-001 · · 0.14892E-004 · · 0.35937E-003 · · 0.54210E-004 · · · 0.19219E-001 · · 0.18817E-001 · · 0.	13694E-001 0.39215E-001 0.20940E-001
0.195981-0010.135081-001 - 0.103981-001 - 0.139981-001 - 0.212281-001 - 0.111978-001 - 0.740108-001 - 0.001091-001 - 0.740108-001 - 0.210091-001 - 0.3302781-001 - 0.33027	-001 · · · · · 9 · · · · 0.61158E-003 · · 0.53219E-003 · · 0.12043E-003 · · 0.12043E-003 · · 0.12043E-003 · · 0.38926E-003 · · · 0.73255E+001 · · 0.16770E+000 · · · -0.13972E-001 · · 0.28970E-001 · · 0.17353E-004 · · · 0.36853E-003 · · 0.57541E-004 · · · · 0.20731E-001 · · 0.20296E-001 · · 0.	
0.2591E-0010.1337E-001 -0.1335E-001 -0.1335E-001 -0.21284E-001 -0.13357E-001 -0.74090E-001 -0.01335E-001 -0.0259E-001 -0.1335E-001 -0.1335E-001 -0.1335E-001 -0.1335E-001 -0.01335E-001 -0.01355E-001 -0.0135E-001 -0.0135E-001 -0.0135E-001 -0.0135E-001 -0.0135E-001 -0.0135E-001 -0.	[-001 · · · · · 9 · · · · 9 · · · · 0.61938E-003 · · 0.53993E-003 · · 0.15771E-003 · · 0.38348E-003 · · · 0.78226E+001 · · 0.19527E+000 · · · -0.14916E-001 · · 0.29962E-001 · · 0.19920E-004 · · 0.37681E-003 · · 0.60744E-004 · · · 0.2246E-001 · · 0.21779E-001 · · 0.	
-0.46000E-0010.18984E+001 -0.10459E+001 -0.2444E+001 -0.10873E-001 -0.75923E-001 -0.	[-001 · · · · · 9 · · · · 9 · · · · 0.62718E-003 · · 0.54439E-003 · · 0.15765E-003 · · 0.3765E-003 · · · 0.23765E-001 · · 0.23266E-001 · · 0.31856E-001 · · 0.31856E-001 · · 0.3258E-004 · · · · 0.3843E-003 · · 0.63826E-004 · · · · 0.23765E-001 · · 0.23266E-001 · · 0.	16842E-001 0.48387E-001 0.25918E-001
0.13526-001 · · · 0.135276-001 · · · 0.13536-001 · · 0.215016-001 · · · 0.13726-001 · · · 0.76796-001	-001 · · · · · · · · · · · · · · · · · ·	17890E-001 0.51447E-001 0.27587E-001
0.50000E-0010.11151E+0010.10605E+0010.21755E+0010.10533E-0010.77605E-0010	-001 · · · · · 9 · · · · 0. 64447E -003 · · 0.55150E -003 · · 0.11843E -003 · · 0.35899E -003 · · · 0.26249E +001 · · 0.26249E +001 · · 0.17751E -001 · · 0.35649E -001 · · 0.35649E -004 · · · 0.39744E -003 · · 0.69608E -004 · · · 0.26812E -001 · · 0.26249E -001 · · 0.26249E -001 · · 0.35649E -001 · · 0.35649E -001 · · 0.35649E -001 · · 0.35649E -003 · · 0.66608E -004 · · · 0.36608E -	18937E-001 0.54509E-001 0.29259E-001
0.27106E-001 · · · 0.1265ZE+001 · · 0.1316ZE+001 · · 0.2375E+000 · · 0.13786E+001 · · 0.83543E+000 · · 0. · 0.52008E-001 · · · 0.1123ZE+001 · · 0.1067SE+001 · · 0.2190TE+001 · · 0.1035ZE-001 · · 0.78373E-001 · · 0 · 0.28544E-001 · · · 0.1372SE+001 · · 0.13230E+001 · · 0.2938E+000 · · 0.13810E+001 · · 0.84230E+000 · · 0	-01.00.00.00.00.00.00.00.00.00.00.00.00.0	19983E-001 -0.57570E-001 -0.30936E-001 -
-0.54000E-0010.11311E+0010.10745E+001 -0.2050E+001 -0.1055E-001 -0.79099E-001 -0.	-001 · · · · · 9 · · · · 9 · · · · 0.65695E-003 · · 0.11859E-003 · · 0.11859E-003 · · 0.34217E-003 · · · 0.2971E-001 · · 0.29246E-001 · · 0.39448E-001 · · 0.39448E-001 · · 0.39448E-004 · · · 0.40843E-003 · · 0.74859E-004 · · · 0.2971E-001 · · 0.29246E-001 · · 0.	21028E-001 -0.50532E-001 -0.32517E-001 -
0.55000E-0010.11389E+0010.10814E+001 .0.22203E+001 .0.99713E-0020.79786E-0010. 0.31754E-0010.13899E+001 .0.13351E+001 .0.94187E+000 .0.13870E+001 .0.85554E+0000	[-001 · · · · · 9 · · · · 9 · · · · 0. 66126E-003 · · 0.55230E-003 · · 0.12098E-003 · · 0.33428E-003 · · · 0.3428E-003 · · · 0.30798E+000 · · · · 0.20595E-001 · · · 0.41351E-001 · · 0.37340E-004 · · 0.41325E-003 · · 0.77277E-004 · · · · 0.31406E-001 · · 0.30750E-001 · · 0.	22072E-001 0.63694E-001 0.34301E-001
.0.58000E-0010.11466E-0010.10881E+0010.22347E+001 .0.97700E-0020.80430E-001 0.33286E-001 0.13967E+001 .0.13424E+001 0.94782E+000 .0.1391E+001 0.86101E+000	-001 · · · · · 9 · · · 0 · · 0 · · 0 · · 0 · · 0 · · 0 · · 0 · 55111E -003 · · 0 · . 12131E -003 · · 0 · . 22043E -001 · · · 0 · · 0 · 32257E -001 · · · 0 · · 2710E -001 · · · 0 · · 4050E -004 · · · 0 · · 4770E -003 · · 0 · 70551E -004 · · · 0 · 32943E -001 · · 0 · 32257E -001 · · 0 · · 0 · 0 · 0 · 0 · 0 · 0 · 0	23116E-001 0.66756E-001 0.35989E-001
-0.00000E-0010.11542E+0010.10947E+0010.22489E+0010.95636E-0020.81059E-0010.34819E-0010.14044E+0010.13485E+0010.95377E+0000.13965E+0010.86811E+0000	:-001 · · · · · 9 · · · · 0.66724E-003 · · 0.54913E-003 · · 0.12143E-003 · · 0.12143E-003 · · 0.31937E-003 · · · 0.11816E+002 · · 0.35549E+000 · · · -0.22495E-001 · · 0.45160E-001 · · 0.45160E-001 · · 0.43867E-004 · · · 0.42179E-003 · · 0.81679E-004 · · · 0.34483E-001 · · 0.3767E-001 · · 0.	24159E-001 0.69818E-001 0.37680E-001
-0.62000E-0010.11616E+0010.11013E+0010.22629E+0010.93498E-0020.81649E-0010. 0.36353E-0010.14119E+0010.13544E+0010.9594E+0000.14017E+0010.87413E+0000.	-081 ··· 9 ·· 9 ·· 9 ·· 0.56845-083 ·· 0.54597E-083 ·· 0.15708E-083 ·· 0.15708E-083 ·· 0.15708E-083 ·· 0.15708E-083 ·· 0.15708E-081 ·· 0.4705E-081 ·· 0.4705	25201E-001 - 0.72878E-001 - 0.39374E-001 -
-0.64000E-0010.11689E+0010.11077E+0010.22766E+0010.91294E-0020.82211E-0010.8.37889E-0010.14192E+0010.13601E+0010.95605E+0000.14067E+0010.87999E+0000.	-001 · · · · · 9 · · · · 0.6689E-003 · 0.5423E-003 · 0.11899E-003 · 0.3666E-003 · · 0.1282E+002 · · 0.4063E+000 · · - 0.2439E-001 · · 0.457E-001 · · 0.4976E-001 · · 0.5074E-004 · · 0.42904E-003 · · 0.4294E-003 · · 0.3757E-001 · · 0.3757E-001 · · 0.36796E-001 · · 0.5074E-004 · · 0.42904E-003 · · 0.5074E-004 · · · 0.3757E-001 · · 0.5074E-001 · 0.5074E-001 · 0.5074E-001 · 0.5074E-00	26243E-001 - 0.75937E-001 - 0.41071E-001
e.66000E-0010.11761E+0010.11140E+0010.22001E+0010.89025E-0020.82747E-0010.89025E-0020.82747E-0010.39425E-0010.14264E+0010.13657E+0010.97212E+0000.14116E+0010.88566E+0000	-001 · · · · · 9 · · · · 0.60872E-003 · · 0.53816E-003 · · 0.12151E-003 · · 0.12151E-003 · · 0.30899E-003 · · · · 0.1324E+002 · · 0.43298E+000 · · · 0.25352E-001 · · 0.5534E-001 · · 0.5536E-001 · · 0.54307E-004 · · · 0.43224E-003 · · 0.87148E-004 · · · 0.39119E-001 · · 0.38315E-001 · · 0.55315E-001 · · 0.5531E-001 ·	27283E-001 - 0.78996E-001 - 0.42771E-001
··0.68000E-001 ···-0.11832E+001 ··0.11202E+001 ··0.23033E+001 ··0.8669E-002 ··0.83259E-001 ··0.8669E-002 ··0.83259E-001 ··0.48963E-001 ··0.81433E+001 ··0.13711E+001 ··0.97814E+000 ··0.14162E+001 ··0.89116E+000 ··0.		28323E-001 0.82052E-001 0.44474E-001
	[-001 · · · · · 9 · · · · 9 · · · · 0.56642E-003 · · 0.52844E-003 · · 0.11919E-003 · · 0.28929E-003 · · · 0.4333E+002 · · 0.436E-001 · · 0.27451E-001 · · 0.54711E-001 · · 0.61697E-004 · · 0.43789E-003 · · 0.8996E-004 · · · 0.4223E-001 · · 0.41363E-001 · · 0.	29362E-001 0.85107E-001 0.46179E-001
··0.72000E-001 ···-0.11970E+001 ··0.11323E+001 ··0.23292E+001 ··0.81923E-002 ··0.84213E-001 ··0.9103E+001 ··0.94042E-001 ···0.14466E+001 ··0.13813E+001 ··0.99003E+000 ··0.14250E+001 ··0.90103E+000 ··0.		30401E-001 0.88160E-001 0.47887E-001
.0.74000E-0010.12037E+0010.11391E+0010.23418E+0010.79352E-0020.84666E-0010. 0.45583E-0010.14526E+0010.13858E+0010.99589E+0000.14287E+0010.90643E+0000	-001 ··· 11 ··· 11 ··· -0. 1234E -004 ·0. 1634ZE -003 ·0. 12209E -003 ·0. 3214F -003 ··· 0. 3214F -003 ··· 0. 1534ZE -002 ··· 0. 1534ZE -002 ··· 0. 1525ZE -001 ··· 0. 2017E -001 ··· 0. 5854ZE -001 ··· 0. 69470E -004 ··· 0. 4422E -003 ··· 0. 2141E -004 ··· 0. 45337E -001 ··· 0. 4442IE -001 ··· 0. 45337E -001 ··· 0. 5854ZE -001 ··· 0. 69470E -004 ··· 0. 4422E -003 ··· 0. 1220E -0. 1220E -003 ··· 0. 1220E -003 ··· 0. 1220E -003 ··· 0. 1220E -0. 1220E -003 ··· 0. 1220E -003 ··· 0. 1220E -003 ··· 0. 1220E -0. 1220E	
· 0.76000E-001 · · · -0.12103E+001 · -0.11439E+001 · · 0.23543E+001 · · 0.76005E-002 · · 0.85099E-001 · · 0.47198E-001 · · · 0.14589E+001 · · 0.13905E+001 · · 0.10017E+001 · · 0.14327E+001 · · 0.91122E+000 · · 0.	+000 0.10000E+001	
· 0.78000E-001 · · · -0.12168E+001 · -0.11496E+001 · ·0.23665E+001 · ·0.74186E-002 · -0.85511E-001 · ·0. 0.48829E-001 · · · ·0.14649E+001 · ·0.13950E+001 · ·0.10075E+001 · ·0.14365E+001 · ·0.91732E+000 · ·0.	-001 ··· 11 ··· 10 ·· 0.7141 -004 ·· 0.15759 -003 ·· 0.1232E -003 ·· 0.3169E -003 ·· 0.3169E -003 ·· 0.16356E -002 ·· 0.1049E +002 ·· -0.3169E -001 ·· 0.3194E -001 ·· 0.539E -001 ·· 0.77674 -004 ·· 0.44651 -003 ·· 0.45517 -004 ·· · 0.4464 -001 ·· 0.47492E -001 ·· 0.4060 -001 ·· 0.4061 -001 ·· 0.4061 -001 ·· 0.4061 -003 ·· 0.4061 -001	
-0.80000E-0010.12233E+0010.11552E+0010.23785E+0010.71406E-0020.85905E-0010.50405E-0010.14402E+0010.13994E+0010.10132E+0010.14402E+0010.92333E+0000	+000···0.10000E+001	
· 0.82000E-001 · · · -0.12296E+001 · -0.11607E+001 · ·0.23903E+001 · ·0.68740E-002 · -0.86280E-001 · ·0. 0.52107E-001 · · · ·0.14765E+001 · ·0.14036E+001 · ·0.10188E+001 · ·0.14436E+001 · ·0.92921E+000 · ·0.	-001 ··· -110· -110 ·· -0.7336:-004 ·· -0.15286:-003 ·· -0.1517E-003 ·· -0.3171E-003 ·· -0.3171E-003 ·· -0.737E-002 ·· -0.7637E-002 ·· -0.33206:-001 ·· -0.33206:-001 ·· -0.6225E-001 ·· -0.8259E-004 ·· -0.4406E-003 ·· -0.4414E-003 ·· -0.51606E-001 ·· -0.5057E-001 ·· -0.5	
-0.84000E-0010.12358E+0010.11662E+0010.24020E+0010.65945E-0020.86640E-0010.8.53755E-0010.1483E+0010.1489E+0010.10245E+0010.14485E+0010.93566E+0000.	.+000····0.10000E+001	N(O)(O)M
0.86000E-0010.12419E+0010.11716E+0010.24135E+0010.63080E-0020.86981E-0010.55405E-0010.14887E+0010.14128E+0010.10301E+0010.14517E+0010.94125E+0000	(+000 · · · · · 0, 10000E+001	
-0.88000E-0010.12479E+0010.11768E+0010.24247E+0010.60150E-0020.87306E-0010.57062E-0010.14547E+0010.14105E+0010.10356E+0010.14547E+0010.94668E+0000.	+000···0.10000E+001	To all
-0.90000E-0010.12538E+0010.11820E+0010.24358E+0010.57159E-0020.87614E-0010.58724E-0010.14989E+0010.14201E+0010.10410E+0010.14575E+0010.95195E+0000.	-001 ··· -0.000 ··· -0.32725E-003 ·· 0.7392E-003 ·· 0.15375E-003 ·· 0.7600E-003 ·· 0.7600E-003 ·· 0.1646E-002 ·· 0.1811E-000 ·· -0.3649E-001 ·· 0.3765E-001 ·· 0.73925E-001 ·· 0.1429E-003 ·· 0.45397E-003 ·· 0.45397E-003 ·· 0.5573E-001 ·· 0.5673E-001 ·· 0.5673E-001 ·· 0.1600E-003 ·· 0.45397E-003 ·· 0.45	DV4
-0.92000E-001 · · · -0.12596E+001 · -0.11871E+001 · ·0.24467E+001 · ·0.54111E-002 · ·0.87907E-001 · ·0.08391E-001 · · ·0.15037E+001 · ·0.14235E+001 · ·0.10464E+001 · ·0.1460E+001 · ·0.95707E+000 · ·0.	+0000.10000E+001	
0.94000E-0010.12653E+0010.11921E+0010.24574E+0010.51009E-0020.88184E-0010.0.62064E-0010.15084E+0010.14268E+0010.16518E+0010.14627E+0010.96204E+0000	5+000 · · · · 0.10000E+001	
-0.96000E-0010.12709E+0010.11970E+0010.24679E+0010.47856E-0020.88447E-0010.6.63741E-0010.15129E+0010.14299E+0010.10570E+0010.14650E+0010.96687E+0000.	+000 · · · · 0, 10000E+001	KO(O)
-0.98000E-0010.12764E+0010.12018E+0010.24783E+0010.44654E-0020.88696E-0010.0.5424E-0010.15172E+0010.14329E+0010.10622E+0010.14672E+0010.97154E+0000.		27E-001 · ·

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0.20000E-0020.15347E+000	0.14970E+000	0.30317E+000	-0.20687E-0020.65533E-0020.55885E-00220-0
- 0.40000E-0020.30695E+000	-0.29939E+000	0.60634E+000	-0.41375E-0020.13107E-0010.11177E-00120
- 0.60000E-0020.46042E+000	-0.44909E+000	0.90951E+000	-0.62062E-0020.19660E-0010.16766E-00120
0.80000E-0020.61386E+000	-0.59875E+000	0.12126E+001	-0.82699E-0020.26227E-0010.22350E-001712
- 0.10000E-0010.76489E+000	0.74601E+000	0.15109E+001	-0.10293E-001 -0.32746E-001 -0.27841E-001 17 21
0.12000E-0010.87989E+000	-0.85736E+000	0.17373E+001	-0.11782E-001 -0.38893E-001 -0.31963E-001 24 25
0.14000E-0010.92867E+000	-0.90298E+000	0.18316E+001	-0.12292E-0010.43981E-0010.33563E-0011919
0.16000E-0010.94871E+000	-0.92026E+000	0.18690E+001	-0.12384E-0010.48157E-0010.34048E-0011414
0.18000E-0010.96191E+000	-0.93095E+000	0.18929E+001	-0.12361E-0010.51748E-0010.34257E-0011212
··0.20000E-001···-0.97347E+000	0.94018E+000	0.19136E+001	-0.12329E-0010.54893E-0010.34375E-001912
··0.22000E-001···-0.98450E+000	0.94904E+000	0.19335E+001	-0.12289E-0010.57678E-0010.34464E-001912
··0.24000E-001···-0.99509E+000	0.95771E+000	0.19528E+001	-0.12215E-0010.60141E-0010.34555E-00199
· 0.26000E-001 · · -0.10055E+001	0.96630E+000	0.19718E+001	-0.12133E-0010.62344E-0010.34639E-00199
· 0.28000E-001 · · -0.10156E+001	0 . 97478E+000	0.19904E+001	-0.12044E-0010.64323E-0010.34718E-00199
· 0.30000E-001 · · -0.10256E+001	0.98316E+000	0.20087E+001	-0.11947E-0010.66111E-0010.34795E-00199
· 0.32000E-001 · · -0.10353E+001	0.99143E+000	0.20268E+001	-0.11842E-0010.67733E-0010.34870E-00199
· 0.34000E-001 · · -0.10449E+001	0 . 99957E+000	0.20445E+001	-0.11729E-0010.69213E-0010.34946E-00199
· 0.36000E-001 · · -0.10543E+001	0.10076E+001	0.20619E+001	-0.11609E-0010.70567E-0010.35023E-00199
· 0.38000E-001 · · -0.10634E+001	0.10155E+001	0.20789E+001	·0.11474E-001·-0.71804E-001·-0.35107E-001·····9···9··
· 0.40000E-001 · · -0.10724E+001	0.10233E+001	0.20957E+001	·0.11334E-001·-0.72949E-001·-0.35194E-001·····9···9··
· 0.42000E-001 · · -0.10812E+001	0.10309E+001	0.21122E+001	-0.11187E-0010.74010E-0010.35285E-00199
· 0.44000E-001 · · -0.10899E+001	0.10385E+001	0.21284E+001	-0.11033E-0010.74999E-0010.35379E-00199
· 0.46000E-001 · · -0.10984E+001	0.10459E+001	0.21444E+001	-0.10873E-0010.75923E-0010.35478E-00199
· 0.48000E-001 · · -0.11068E+001	0.10533E+001	0.21601E+001	-0.10706E-0010.76790E-0010.35581E-00199
· 0.50000E-001 · · -0.11151E+001	0.10605E+001	0.21755E+001	-0.10533E-0010.77605E-0010.35689E-00199
· 0.52000E-001 · · -0.11232E+001	0.10675E+001	0.21907E+001	-0.10352E-0010.78373E-0010.35802E-00199
· 0.54000E-001 · · -0.11311E+001	0.10745E+001	0.22056E+001	-0.10165E-0010.79099E-0010.35921E-00199
· 0.56000E-001 · · -0.11389E+001	0.10814E+001	0.22203E+001	-0.99713E-0020.79786E-0010.36046E-00199
· ·0.58000E-001 · · ·-0.11466E+001	3123332	3,123,12	
··0.60000E-001···-0.11542E+001	37233112 332	3,122.332.332	-0.95636E-0020.81059E-0010.36315E-00199
··0.62000E-001···-0.11616E+001	0.11013E+001	0.22629E+001	-0.93498E-0020.81649E-0010.36461E-00199
0.64000E-001 -0.11689E+001	-0.11077E+001	0.22766E+001	-0.91294E-0020.82211E-0010.36613E-00199

```
table \leftarrow \neg \Box NGET'/t/proc.out'1
d \leftarrow \downarrow \Diamond \uparrow \{ \neg \{ \land /\alpha : \omega \land \Box SIGNAL 7 \} / \Box VFI'0'@(=\circ'+')'^-'@(=\circ'-')\omega \} ^{"}1 \downarrow table
\Box CSV \boxdot 'Separator' ' '\vdash ('\land \backslash s+' ' \backslash s+' \Box R'' ' '\vdash table)'S' 4
```

```
Tutorials
                                    □CSV
Tools and Interface Catalogue
                                    The Comma Separator Values system function □csv can read tabular data from .csv files as APL matrices, Comma separated
Application Development and
Deployment
                                    values are a very common and convenient. While we encourage you to read the documentation for a full description, here is an
External Language Interfaces
                                    overview of features of Ticsy:
and Standard Libraries

    Read data from and write data to files directly

File handling and data
processing
 Binary files or arbitrary file
                                          data ← [CSV '/path/to/file.csv'
 types
 Text Files
                                      • Separate the header (first row) from the rest of the data
 Tabular data
 □CSV
                                          (data header) ← □CSV '/path/to/file.csv' + 10 11
 □JSON

    Treat specific columns of input as numeric or text, depending on the options provided.

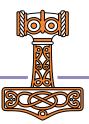
 \square XML
                                        The 4 here indicates to convert numeric values if possible, else keep the value as text.
 \square R/\square S
 \squareMAP
                                          numeric_if_possible + [CSV '/path/to/file.csv' + 4
 □JSON
 Component files
                                      • Use a separator other than commas, using the "Separator" variant option, for example using tabs ( ☐ucs 9 ) for Tab Separated
 Downloading data from the
                                        Values (.tsv).
 internet
 SQL Interface
                                          tsv ← [CSVE'Separator' ([UCS 9)+'/path/to/file.csv'
   Features
   Getting Started
                                      • Read data chunks at a time so as to not fill the workspace, using the "Records" variant option.
Web communications
                                             Example
```

'LoadTEXT'□CY'loaddata' □←3↑t←LoadTEXT '\tmp\proc.out'

time	11	22	33	12	
0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0
0.20000E-002	-0.15347E+000	-0.14970E+000	0.30317E+000	0.20687E-002	-0

What else do we need?

- Practical APL
- Show the rest of the world that we can do
- Tools for leveraging APL in the context of modern software



APL as a Tool of Thought



