



Kornucopia®

*Smart-Tools for Analyzing
Noisy & Challenging Problems™*

*Listing of Table of Contents, Functions, and
Example Worksheets*

Table of Contents

Introduction and Overview

- Getting Started with Kornucopia®
- Navigating Kornucopia® help & worksheets efficiently
- The ADV parameter
- Details of using Kornucopia® & Mathcad® efficiently
- Troubleshooting

List of Functions

- Alphabetical
- Categorical

Enhanced File Read/Write

- Reading & writing ASCII files via functions
- List/Create/Move/Copy/Delete/Rename files and directories
- Writing functions with overwrite protection
- Unpacking a file with multiple data samples repeatedly stacked (with or without headers)
- Determining if a file exists and the number of rows it has without reading it in
- More

Array and String Manipulation

- Reordering rows and cols in an array
- Array cleanup functions
- Easily creating "range" vectors with various spacing options
- Nested array tools
- Finding array elements that meet various criteria
- String manipulation and parsing
- More

Data Adjusting

- Easy-to-use data tweaking via linear or quadratic methods
- Data trimming and shifting functions
- Creating an average XY data curve from multiple curves
- Rescaling data vectors
- More

Easy-to-use DSP

- Data regularization and functions to evaluate non-constant sample rates
- Fourier analysis (FFT & PSD) and Windows
- Frequency Response Functions (FRF)
- IIR & FIR Filtering (LP, HP, BP, BS)
- Decimation and upsampling
- Easy-to-use data smoothing
- More

Integration & Derivatives

- Work efficiently with vectors and arrays of data
- Data can have non-constant X increments.
- Single & successive integrations, including initial conditions
- Single & successive derivatives
- More

Misc. Functions & Cool Stuff

- Message box popup function
- Scriptless push-buttons
- Easily run external programs & play AVI videos
- "IsSomething" functions
- arclength, even and odd rounding
- More

Extra Units

- Additional unit definitions
- msec and μ sec
- snail – a mass unit when length is inch and force is lbf
- mm_Hg – a unit of pressure (medical field)
- tex and den – linear mass density (textiles)
- More

Example Worksheets

- Easy to advanced examples and applications
- Teaching examples and tutorials
- Real-world examples ranging from academic research to industrial applications

Alphabetical Listing of Functions

arcLength_k(data, ADV)	fourierMag_k(Ydata, winFunc, ADV)	regularize_k(XYdata, ADV)
averageXY_k(XYnested, method, ADV)	fourierPhase_k(Ydata, winFunc, ADV)	reorder_k(array, meth, mode, order, ADV)
blackman_k(winLength, ADV)	fourierResolution_k(Xdata, ADV)	rescale_k(vec, V1, V2, ADV)
boxcar_k(winLength, ADV)	FRF_k(C, Wplot, ADV)	resolve_k(DEFAULTS)
butter_k(ADV)	FRFdelay_k(Fs, C, Wplot, ADV)	roundEven_k(X, ADV)
cFIR_k(type, winFunc, Wc, ADV)	FRFmag_k(C, Wplot, ADV)	roundOdd_k(X, ADV)
cheby1_k(ADV)	FRFphase_k(C, Wplot, ADV)	runExternal_k(Dir, command, wait, ADV)
cheby1Epsilon_k(ripple, ADV)	FRFplot_k(Wc, ADV)	samplingFreq_k(Xv, ADV)
cheby1Ripple_k(epsilon, ADV)	gaussian_k(winLength, ADV)	samplingInc_k(Xv, ADV)
clIR_k(type, form, Wc, ADV)	hamming_k(winLength, ADV)	shiftData_k(data, method, vals, ADV)
clIRgeneral_k(type, Canalog, Wc, ADV)	hann_k(winLength, ADV)	smoothXY_k(XYdata, factor, ADV)
cleanupZeros_k(data, method, ADV)	incPlot_k(Xv, ADV)	smoothY_k(Ydata, factor, ADV)
decimateCutoff_k(fsOrig, R, ADV)	indexFind_k(data, condition, val, ADV)	stringCleanup_k(input, meth, chars, ADV)
decimateX_k(Xdata, R, ADV)	integrate1_k(Xdata, Ydata, IC1, ADV)	stringToNum_k(input, ADV)
decimateXY_k(XYdata, R, ADV)	integrate2_k(Xdata, Ydata, IC1, IC2, ADV)	submatrix_k(array, ir, jr, ic, jc, ADV)
decimateY_k(Ydata, R, ADV)	IsFile_k(fileName, ADV)	summary_k(data, ADV)
derivative1_k(Xdata, Ydata, ADV)	IsNumeric_k(item, ADV)	triangle_k(winLength, ADV)
derivative2_k(Xdata, Ydata, ADV)	kaiser_k(winLength, ADV)	trim_k(array, vecSearch, val1, val2, ADV)
dirCopy_k(sourceName, toName, ADV)	licenseDaysRemaining_k(Dummy)	tweakXY_k(side, XYdata, masterColIndex, tweakToVal, baseLength, ADV)
dirCreate_k(sourceName, ADV)	mag_k(complexData, ADV)	unpack_k(array, colSearch, markers, shiftRows, ADV)
dirDelete_k(sourceName, ADV)	msgBox_k(title, msg, button, ADV)	upsampleX_k(Xdata, Q, ADV)
dirList_k(directoryName, qualifier, ADV)	nestPlot_k(nestedData, ADV)	upsampleXY_k(XYdata, Q, ADV)
dirMove_k(sourceName, toName, ADV)	nuttall_k(winLength, ADV)	upsampleY_k(Ydata, Q, ADV)
dirRename_k(sourceName, toName, ADV)	nyquistFreq_k(Xv, ADV)	vectorByOctaves_k(Xmin, Xmax, pointsPerOctave, ADV)
examplesDataDir_k(Dummy)	octave_k(f1, f2, ADV)	vectorByPoints_k(firstVal, lastVal, n, ADV)
exponential_k(winLength, ADV)	padXY_k(side, XYdata, Xlength, ADV)	vectorBySampling_k(Xmin, Xmax, fs, ADV)
fileCopy_k(sourceName, toName, ADV)	phase_k(complexData, ADV)	video_k(fileName, ADV)
fileDelete_k(sourceName, ADV)	psd_k(Xdata, Ydata, winFunc, blockSize, overlap, ADV)	writeASCII_k(Name, data, delimiter, ADV)
fileMove_k(sourceName, toName, ADV)	psdFreq_k(Xdata, blockSize, ADV)	writeOutput_k(Name, data, writeFun, ADV)
fileRename_k(sourceName, toName, ADV)	psdResolution_k(Xdata, blockSize, ADV)	writePopup_k(fileName, ADV)
fileRows_k(fileName, ADV)	pushCheck_k(buttonVar, Index, ADV)	WRITEPRN_k(fileName, data, ADV)
fill_k(entity, nRows, nCols, ADV)	readASCII_k(fileName, delimiter, ADV)	
filterXY_k(XYdata, C, ADV)	readInput_k(fileName, readFunc, ADV)	
filterY_k(Ydata, C, ADV)	readLineAsText_k(file, lineIndex, ADV)	
fourierFreq_k(Xdata, ADV)	READPRN_k(fileName, ADV)	
fourierCoeffs_k(Ydata, winFunc, ADV)		

Listing of Example Worksheets

Tutorials

- Overview of Mathcad® and Kornucopia®
- Mathcad Basics: Regions, Calculation Order, and Creating/Editing Math Regions
- Working with Units
- Example 1: Simple Analytical Calculations
- Example 2: Working with a Simple ASCII data file
- Arrays, Range Variables, and Looping
- Reading & Writing ASCII Data Files via Kornucopia
- Tips on Using Solve-Blocks
- Easy-to-use Programming within Mathcad
- Explaining the Advanced Options Parameter (ADV) in Kornucopia
- Kornucopia® Quick Start Guide

Simple Usage Examples

- Computing Arc Lengths of Discrete Data
- Creating an Average Curve: Simple Example
- Fourier Analysis and Filtering Basics
- Making Worksheets More Interactive
- Reading & Writing ASCII Data Files via Kornucopia®
- Tweaking Data: Simple Example
- Typical Fourier and Filter Application - Impact Analysis of a Steel Ball Against a Plastic Lens

Elaborate Examples

- Catenary Analysis
- Cleaning, Averaging, and Tweaking Data

Elaborate Examples (Cont.)

- Creating Elastic/Plastic Material Data for FE Analyses
- DCB Failure
- Decimation of Data (with Antialiasing filter)
- Computing Derivatives and Integrals of Discrete Data via Kornucopia® (Three Typical Examples)
- A Detailed Look at Computing Derivatives and Integrals of Discrete Data via Mathcad and Kornucopia®
- General Interpolation via Arc Length Parameterization with Rescaling
- Highpass Filtering of a Plate Shock Problem
- Hysteretic and Cyclic Data – Automating the Processing via Kornucopia®
- Improving User-Friendliness of Mathcad Worksheets
- Learning DSP (Filtering and Frequency Analysis) Using Simple Signals
- Lens-Ball Impact Analysis
- Moon-Penetration Transient Analysis: Comparing Experiment and FE Model Prediction
- Processing Multiple Files Efficiently via Kornucopia®
- Processing a Packed File Efficiently via Kornucopia®
- Protective Barrier Analysis (A "Rough-Cut" Evaluation)
- Salvaging PE Shock Data
- Sliding Contact - Improving Predictions of Sliding Contact Models from Explicit Dynamics Analyses
- T-bracket Failure Analysis of a Metal Component
- Tricks for Plotting Multiple Curves