Chandra X-ray Center

AHELP for CIAO 3.4   **math**   Context: slang

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Synopsis

Mathematical operations in S−Lang.

Description

S−Lang contains a number of commonly−used mathematical functions – such as sin, cos, exp, log – as well as allowing the use of user−defined functions. These functions will work on arrays of numbers as well as single elements:

```
chips> x = 0.456
chips> y = sin(x)
chips> print(y)
0.44036
chips> xarr = [1:10] / 3.0
chips> yarr = sin(xarr)
chips> writeascii(stdout,xarr,yarr)
0.333333        0.327195
0.666667        0.61837
1       0.841471
1.33333 0.971938
1.66667 0.995408
2       0.909297
2.33333 0.723086
2.66667 0.457273
3       0.14112
3.33333 −0.190568
chips> print(yarr[2])
0.841471
```

S−Lang also provides means to easily manipulate subsets of arrays. In the example below we use the where() function to find the array indices of those elements whose values are less than 0.1, and then print out these indices, together with the corresponding values:

```
chips> y = sin([0:10:0.5])
chips> i = where( y < 0.1 )
chips> writeascii( stdout, i, y[i] )
0       0
7       −0.350783
8       −0.756802
9       −0.97753
10      −0.958924
11      −0.70554
12      −0.279415
19      −0.0751511
```

Using S–Lang with ChIPS and Sherpa

S–Lang variables can be used by ChIPS and Sherpa. The following plots the previously–calculated x and y arrays using a S–Lang function – curve() – and then modifies the plot using ChIPS commands.

```
chips> () = curve(xarr,yarr)
chips> simpleline
chips> symbol none
chips> title "A combined S-Lang/ChIPS plot"
```

It is also easy to read in a file – using Varmm functions – then manipulate the data and produce graphical output.

```
chips> dat = readfile("phas.dat")
chips> print(dat)
_filename         = phas.dat
_path             = /ciao/data
_filter           = NULL
_filetype         = 1
_ncols            = 2
_nrows            = 124
col1              = Float_Type[124]
col2              = Float_Type[124]
chips> () = curve(dat.col1,dat.col2)
chips> newvar = log(dat.col2 + 1) + 10
chips> split 2
chips> () = curve(dat.col1,newvar)
```

The tips page ("ahelp tips") provides a number of examples demonstrating how to write S–Lang code.

See Also

chips
        chips, chips_eval
modules
        varmm
sherpa
        sherpa_eval
slang
        overview, slang, tips, variables
tools
        ascii2fits

Using S–Lang with ChIPS and Sherpa