NumPy for R (and S-Plus) users

Help

R/S-Plus	Python	Description
`help.start()`	`help()`	Browse help interactively
`help()`	`help`	Help on using help
`help(plot)` *or* `?plot`	`help(plot)` *or* `?plot`	Help for a function
`help(package='splines')`	`help(pylab)`	Help for a toolbox/library package
`demo()`		Demonstration examples
`example(plot)`		Example using a function

Searching available documentation

R/S-Plus	Python	Description
`help.search('plot')`		Search help files
`apropos('plot')`		Find objects by partial name
`library()`	`help(); modules [Numeric]`	List available packages
`find(plot)`	`help(plot)`	Locate functions
`methods(plot)`		List available methods for a function

Using interactively

R/S-Plus	Python	Description
`Rgui`	`ipython -pylab`	Start session
	`TAB`	Auto completion
`source('foo.R')`	`execfile('foo.py')` *or* `run foo.py`	Run code from file
`history()`	`hist -n`	Command history
`savehistory(file=".Rhistory")`		Save command history

`q(save='no')`	`CTRL-D`
	`CTRL-Z # windows`
	`sys.exit()`
		End session

Operators

R/S-Plus	Python	Description
`help(Syntax)`		Help on operator syntax

Arithmetic operators

R/S-Plus	Python	Description
`a<-1; b<-2`	`a=1; b=1`	Assignment; defining a number
`a + b`	`a + b` *or* `add(a,b)`	Addition
`a - b`	`a - b` *or* `subtract(a,b)`	Subtraction
`a * b`	`a * b` *or* `multiply(a,b)`	Multiplication
`a / b`	`a / b` *or* `divide(a,b)`	Division

`a ^ b`	`a ** b`
	`power(a,b)`
	`pow(a,b)`
		Power, a^b

`a %% b`	`a % b`
	`remainder(a,b)`
	`fmod(a,b)`
		Remainder

`a %/% b`		Integer division
	`a+=b` *or* `add(a,b,a)`	In place operation to save array creation overhead
`factorial(a)`		Factorial, $n!$

Relational operators

R/S-Plus	Python	Description
`a == b`	`a == b` *or* `equal(a,b)`	Equal
`a < b`	`a < b` *or* `less(a,b)`	Less than
`a > b`	`a > b` *or* `greater(a,b)`	Greater than
`a <= b`	`a <= b` *or* `less_equal(a,b)`	Less than or equal
`a >= b`	`a >= b` *or* `greater_equal(a,b)`	Greater than or equal
`a != b`	`a != b` *or* `not_equal(a,b)`	Not Equal

Logical operators

R/S-Plus	Python	Description
`a && b`	`a and b`	Short-circuit logical AND
`a || b`	`a or b`	Short-circuit logical OR
`a & b`	`logical_and(a,b)` *or* `a and b`	Element-wise logical AND
`a | b`	`logical_or(a,b)` *or* `a or b`	Element-wise logical OR
`xor(a, b)`	`logical_xor(a,b)`	Logical EXCLUSIVE OR
`!a`	`logical_not(a)` *or* `not a`	Logical NOT

root and logarithm

R/S-Plus	Python	Description
`sqrt(a)`	`math.sqrt(a)`	Square root
`log(a)`	`math.log(a)`	Logarithm, base e (natural)
`log10(a)`	`math.log10(a)`	Logarithm, base 10
`log2(a)`	`math.log(a, 2)`	Logarithm, base 2 (binary)

`exp(a)`	`math.exp(a)`	Exponential function

Round off

R/S-Plus	Python	Description
`round(a)`	`around(a)` *or* `math.round(a)`	Round
`ceil(a)`	`ceil(a)`	Round up
`floor(a)`	`floor(a)`	Round down
	`fix(a)`	Round towards zero

Mathematical constants

R/S-Plus	Python	Description
`pi`	`math.pi`	$\pi=3.141592$
`exp(1)`	`math.e` *or* `math.exp(1)`	$e=2.718281$

Missing values; IEEE-754 floating point status flags

R/S-Plus	Python	Description
	`nan`	Not a Number
	`inf`	Infinity, ∞
	`plus_inf`	Infinity, $+\infty$
	`minus_inf`	Infinity, $-\infty$
	`plus_zero`	Plus zero, $+0$
	`minus_zero`	Minus zero, -0

Complex numbers

R/S-Plus	Python	Description
`1i`	`z = 1j`	Imaginary unit
`z <- 3+4i`	`z = 3+4j` *or* `z = complex(3,4)`	A complex number, $3+4i$
`abs(3+4i)` *or* `Mod(3+4i)`	`abs(3+4j)`	Absolute value (modulus)
`Re(3+4i)`	`z.real`	Real part
`Im(3+4i)`	`z.imag`	Imaginary part
`Arg(3+4i)`		Argument
`Conj(3+4i)`	`z.conj(); z.conjugate()`	Complex conjugate

Trigonometry

R/S-Plus	Python	Description
`atan2(b,a)`	`atan2(b,a)`	Arctangent, $\arctan(b/a)$
	`hypot(x,y)`	Hypotenus; Euclidean distance

Generate random numbers

R/S-Plus	Python	Description
`runif(10)`	`random.random((10,))` `random.uniform((10,))`	Uniform distribution
`runif(10, min=2, max=7)`	`random.uniform(2,7,(10,))`	Uniform: Numbers between 2 and 7
`matrix(runif(36),6)`	`random.uniform(0,1,(6,6))`	Uniform: 6,6 array
`rnorm(10)`	`random.standard_normal((10,))`	Normal distribution

Vectors

R/S-Plus	Python	Description
`a <- c(2,3,4,5)`	`a=array([2,3,4,5])`	Row vector, $1 \times n$-matrix

`adash <- t(c(2,3,4,5))`	`array([2,3,4,5])[:,NewAxis]`
	`array([2,3,4,5]).reshape(-1,1)`
	`r_[1:10,'c']`
		Column vector, $m \times 1$-matrix

Sequences

R/S-Plus	Python	Description
`seq(10)` *or* `1:10`	`arange(1,11, dtype=Float)` `range(1,11)`	1,2,3, ... ,10
`seq(0,length=10)`	`arange(10.)`	0.0,1.0,2.0, ... ,9.0
`seq(1,10,by=3)`	`arange(1,11,3)`	1,4,7,10
`seq(10,1)` *or* `10:1`	`arange(10,0,-1)`	10,9,8, ... ,1
`seq(from=10,to=1,by=-3)`	`arange(10,0,-3)`	10,7,4,1
`seq(1,10,length=7)`	`linspace(1,10,7)`	Linearly spaced vector of n=7 points
`rev(a)`	`a[::-1]` *or*	Reverse
	`a.fill(3), a[:] = 3`	Set all values to same scalar value

Concatenation (vectors)

R/S-Plus	Python	Description
`c(a,a)`	`concatenate((a,a))`	Concatenate two vectors
`c(1:4,a)`	`concatenate((range(1,5),a), axis=1)`	

Repeating

R/S-Plus	Python	Description
`rep(a,times=2)`	`concatenate((a,a))`	1 2 3, 1 2 3
`rep(a,each=3)`	`a.repeat(3)` *or*	1 1 1, 2 2 2, 3 3 3

`rep(a,a)`	`a.repeat(a)` *or*	1, 2 2, 3 3 3

Miss those elements out

R/S-Plus	Python	Description
`a[-1]`	`a[1:]`	miss the first element
`a[-10]`		miss the tenth element
`a[-seq(1,50,3)]`		miss 1,4,7, ...
	`a[-1]`	last element
	`a[-2:]`	last two elements

Maximum and minimum

R/S-Plus	Python	Description
`pmax(a,b)`	`maximum(a,b)`	pairwise max
`max(a,b)`	`concatenate((a,b)).max()`	max of all values in two vectors
`v <- max(a) ; i <- which.max(a)`	`v,i = a.max(0),a.argmax(0)`	

Vector multiplication

R/S-Plus	Python	Description
`a*a`	`a*a`	Multiply two vectors
	`dot(u,v)`	Vector dot product, $u \cdot v$

Matrices

R/S-Plus	Python	Description
`rbind(c(2,3),c(4,5))` `array(c(2,3,4,5), dim=c(2,2))`	`a = array([[2,3],[4,5]])`	Define a matrix

Concatenation (matrices); rbind and cbind

R/S-Plus	Python	Description
`rbind(a,b)`	`concatenate((a,b), axis=0)` `vstack((a,b))`	Bind rows
`cbind(a,b)`	`concatenate((a,b), axis=1)` `hstack((a,b))`	Bind columns
	`concatenate((a,b), axis=2)` `dstack((a,b))`	Bind slices (three-way arrays)
	`concatenate((a,b), axis=None)`	Concatenate matrices into one vector
`rbind(1:4,1:4)`	`concatenate((r_[1:5],r_[1:5])).reshape(2,-1)` `vstack((r_[1:5],r_[1:5]))`	Bind rows (from vectors)
`cbind(1:4,1:4)`		Bind columns (from vectors)

Array creation

R/S-Plus	Python	Description
`matrix(0,3,5)` *or* `array(0,c(3,5))`	`zeros((3,5),Float)`	0 filled array
	`zeros((3,5))`	0 filled array of integers
`matrix(1,3,5)` *or* `array(1,c(3,5))`	`ones((3,5),Float)`	1 filled array
`matrix(9,3,5)` *or* `array(9,c(3,5))`		Any number filled array
`diag(1,3)`	`identity(3)`	Identity matrix
`diag(c(4,5,6))`	`diag((4,5,6))`	Diagonal
	`a = empty((3,3))`	Empty array

Reshape and flatten matrices

R/S-Plus	Python	Description
`matrix(1:6,nrow=3,byrow=T)`	`arange(1,7).reshape(2,-1)` `a.setshape(2,3)`	Reshaping (rows first)
`matrix(1:6,nrow=2)` `array(1:6,c(2,3))`	`arange(1,7).reshape(-1,2).transpose()`	Reshaping (columns first)
`as.vector(t(a))`	`a.flatten()` *or*	Flatten to vector (by rows, like comics)
`as.vector(a)`	`a.flatten(1)`	Flatten to vector (by columns)
`a[row(a) <= col(a)]`		Flatten upper triangle (by columns)

Shared data (slicing)

R/S-Plus	Python	Description
`b = a`	`b = a.copy()`	Copy of a

Indexing and accessing elements (Python: slicing)

R/S-Plus	Python	Description

`a <- rbind(c(11, 12, 13, 14),`
`c(21, 22, 23, 24),`
`c(31, 32, 33, 34))`
	`a = array([[ 11, 12, 13, 14 ],`
	`[ 21, 22, 23, 24 ],`
	`[ 31, 32, 33, 34 ]])`
		Input is a 3,4 array

`a[2,3]`	`a[1,2]`	Element 2,3 (row,col)
`a[1,]`	`a[0,]`	First row
`a[,1]`	`a[:,0]`	First column
	`a.take([0,2]).take([0,3], axis=1)`	Array as indices
`a[-1,]`	`a[1:,]`	All, except first row
	`a[-2:,]`	Last two rows
	`a[::2,:]`	Strides: Every other row
	`a[...,2]`	Third in last dimension (axis)
`a[-2,-3]`		All, except row,column (2,3)

`a[,-2]`	`a.take([0,2,3],axis=1)`	Remove one column
	`a.diagonal(offset=0)`	Diagonal

Assignment

R/S-Plus	Python	Description
`a[,1] <- 99`	`a[:,0] = 99`	
`a[,1] <- c(99,98,97)`	`a[:,0] = array([99,98,97])`	
`a[a>90] <- 90`	`(a>90).choose(a,90)` `a.clip(min=None, max=90)`	Clipping: Replace all elements over 90
	`a.clip(min=2, max=5)`	Clip upper and lower values

Transpose and inverse

R/S-Plus	Python	Description
`t(a)`	`a.conj().transpose()`	Transpose
	`a.transpose()`	Non-conjugate transpose
`det(a)`	`linalg.det(a)` *or*	Determinant
`solve(a)`	`linalg.inv(a)` *or*	Inverse
`ginv(a)`	`linalg.pinv(a)`	Pseudo-inverse
	`norm(a)`	Norms
`eigen(a)$values`	`linalg.eig(a)[0]`	Eigenvalues
`svd(a)$d`	`linalg.svd(a)`	Singular values
	`linalg.cholesky(a)`	Cholesky factorization
`eigen(a)$vectors`	`linalg.eig(a)[1]`	Eigenvectors
`rank(a)`	`rank(a)`	Rank

Sum

R/S-Plus	Python	Description
`apply(a,2,sum)`	`a.sum(axis=0)`	Sum of each column
`apply(a,1,sum)`	`a.sum(axis=1)`	Sum of each row
`sum(a)`	`a.sum()`	Sum of all elements
	`a.trace(offset=0)`	Sum along diagonal
`apply(a,2,cumsum)`	`a.cumsum(axis=0)`	Cumulative sum (columns)

Sorting

R/S-Plus	Python	Description
	`a = array([[4,3,2],[2,8,6], [1,4,7]])`	Example data
`t(sort(a))`	`a.ravel().sort()` *or*	Flat and sorted
`apply(a,2,sort)`	`a.sort(axis=0)` *or* `msort(a)`	Sort each column

`t(apply(a,1,sort))`	`a.sort(axis=1)`	Sort each row
	`a[a[:,0].argsort(),]`	Sort rows (by first row)
`order(a)`	`a.ravel().argsort()`	Sort, return indices
	`a.argsort(axis=0)`	Sort each column, return indices
	`a.argsort(axis=1)`	Sort each row, return indices

Maximum and minimum

R/S-Plus	Python	Description
`apply(a,2,max)`	`a.max(0)` *or* `amax(a [,axis=0])`	max in each column
`apply(a,1,max)`	`a.max(1)` *or* `amax(a, axis=1)`	max in each row
`max(a)`	`a.max()` *or*	max in array
`i <- apply(a,1,which.max)`		return indices, i
`pmax(b,c)`	`maximum(b,c)`	pairwise max
`apply(a,2,cummax)`		
	`a.ptp(); a.ptp(0)`	max-to-min range

Matrix manipulation

R/S-Plus	Python	Description
`a[,4:1]`	`fliplr(a)` *or* `a[:,::-1]`	Flip left-right
`a[3:1,]`	`flipud(a)` *or* `a[::-1,]`	Flip up-down
	`rot90(a)`	Rotate 90 degrees
`kronecker(matrix(1,2,3),a)`	`kron(ones((2,3)),a)`	Repeat matrix: [a a a ; a a a]
`a[lower.tri(a)] <- 0`	`triu(a)`	Triangular, upper
`a[upper.tri(a)] <- 0`	`tril(a)`	Triangular, lower

Equivalents to "size"

R/S-Plus	Python	Description
`dim(a)`	`a.shape` *or* `a.getshape()`	Matrix dimensions
`ncol(a)`	`a.shape[1]` *or* `size(a, axis=1)`	Number of columns
`prod(dim(a))`	`a.size` *or* `size(a[, axis=None])`	Number of elements
	`a.ndim`	Number of dimensions
`object.size(a)`	`a.nbytes`	Number of bytes used in memory

Matrix- and elementwise- multiplication

R/S-Plus	Python	Description
`a * b`	`a * b` *or* `multiply(a,b)`	Elementwise operations
`a %*% b`	`matrixmultiply(a,b)`	Matrix product (dot product)
	`inner(a,b)` *or*	Inner matrix vector multiplication $a\cdot b'$

`outer(a,b)` *or* `a %o% b`	`outer(a,b)` *or*	Outer product
`crossprod(a,b)` *or* `t(a) %*% b`		Cross product
`kronecker(a,b)`	`kron(a,b)`	Kronecker product
`solve(a,b)`	`linalg.solve(a,b)`	Left matrix division, $b^{-1} {\cdot}a$ \newline (solve linear equations)
	`vdot(a,b)`	Vector dot product
	`cross(a,b)`	Cross product

Find; conditional indexing

R/S-Plus	Python	Description
`which(a != 0)`	`a.ravel().nonzero()`	Non-zero elements, indices
`which(a != 0, arr.ind=T)`	`(i,j) = a.nonzero()` `(i,j) = where(a!=0)`	Non-zero elements, array indices
`ij <- which(a != 0, arr.ind=T);` `v <- a[ij]`	`v = a.compress((a!=0).flat)` `v = extract(a!=0,a)`	Vector of non-zero values
`which(a>5.5)`	`(a>5.5).nonzero()`	Condition, indices
`ij <- which(a>5.5, arr.ind=T); v <- a[ij]`	`a.compress((a>5.5).flat)`	Return values
	`where(a>5.5,0,a)` *or* `a * (a>5.5)`	Zero out elements above 5.5
	`a.put(2,indices)`	Replace values

Multi-way arrays

R/S-Plus	Python	Description
	`a = array([[[1,2],[1,2]], [[3,4],[3,4]]])`	Define a 3-way array
	`a[0,...]`	

File input and output

R/S-Plus	Python	Description
`f <- read.table("data.txt")`	`f = fromfile("data.txt")` `f = load("data.txt")`	Reading from a file (2d)
`f <- read.table("data.txt")`	`f = load("data.txt")`	Reading from a file (2d)
`f <- read.table(file="data.csv", sep=";")`	`f = load('data.csv', delimiter=';')`	Reading fram a CSV file (2d)
`write(f,file="data.txt")`	`save('data.csv', f, fmt='%.6f', delimiter=';')`	Writing to a file (2d)
	`f.tofile(file='data.csv', format='%.6f', sep=';')`	Writing to a file (1d)
	`f = fromfile(file='data.csv', sep=';')`	Reading from a file (1d)

Plotting

Basic x-y plots

R/S-Plus	Python	Description
`plot(a, type="l")`	`plot(a)`	1d line plot
`plot(x[,1],x[,2])`	`plot(x[:,0],x[:,1],'o')`	2d scatter plot
	`plot(x1,y1,'bo', x2,y2,'go')`	Two graphs in one plot

`plot(x1,y1)`
`matplot(x2,y2,add=T)`
	`plot(x1,y1,'o')`
	`plot(x2,y2,'o')`
	`show() # as normal`
		Overplotting: Add new plots to current

	`subplot(211)`	subplots
`plot(x,y,type="b",col="red")`	`plot(x,y,'ro-')`	Plotting symbols and color

Axes and titles

R/S-Plus	Python	Description
`grid()`	`grid()`	Turn on grid lines
`plot(c(1:10,10:1), asp=1)`	`figure(figsize=(6,6))`	1:1 aspect ratio
`plot(x,y, xlim=c(0,10), ylim=c(0,5))`	`axis([ 0, 10, 0, 5 ])`	Set axes manually
`plot(1:10, main="title", xlab="x-axis", ylab="y-axis")`		Axis labels and titles
	`text(2,25,'hello')`	Insert text

Log plots

R/S-Plus	Python	Description
`plot(x,y, log="y")`	`semilogy(a)`	logarithmic y-axis
`plot(x,y, log="x")`	`semilogx(a)`	logarithmic x-axis
`plot(x,y, log="xy")`	`loglog(a)`	logarithmic x and y axes

Filled plots and bar plots

R/S-Plus	Python	Description

`plot(t,s, type="n", xlab="", ylab="")`
`polygon(t,s, col="lightblue")`
`polygon(t,c, col="lightgreen")`
	`fill(t,s,'b', t,c,'g', alpha=0.2)`	Filled plot

`stem(x[,3])`		Stem-and-Leaf plot

Functions

R/S-Plus	Python	Description
`f <- function(x) sin(x/3) -`		Defining functions

`cos(x/5)`		

`plot(f, xlim=c(0,40), type='p')`	`x = arrayrange(0,40,.5)`
	`y = sin(x/3) - cos(x/5)`
	`plot(x,y, 'o')`
		Plot a function for given range

Polar plots

R/S-Plus	Python	Description
	`theta = arange(0,2*pi,0.001)` `r = sin(2*theta)`	
	`polar(theta, rho)`	

Histogram plots

R/S-Plus	Python	Description
`hist(rnorm(1000))`		
`hist(rnorm(1000), breaks= -4:4)`		

`hist(rnorm(1000),`
`breaks=c(seq(-5,0,0.25),`
`seq(0.5,5,0.5)), freq=F)`		

`plot(apply(a,1,sort),type="l")`		

3d data

Contour and image plots

R/S-Plus	Python	Description

`contour(z)`	`levels, colls = contour(Z, V,`
	`origin='lower', extent=`
	`(-3,3,-3,3))`
	`clabel(colls, levels, inline=1,`
	`fmt='%1.1f', fontsize=10)`
		Contour plot

`filled.contour(x,y,z,`
`nlevels=7, color=gray.colors)`
	`contourf(Z, V,`
	`cmap=cm.gray,`
	`origin='lower',`
	`extent=(-3,3,-3,3))`
		Filled contour plot

`image(z, col=gray.colors(256))`	`im = imshow(Z,`
	`interpolation='bilinear',`
	`origin='lower',`
	`extent=(-3,3,-3,3))`
		Plot image data

	`# imshow() and contour() as above`	Image with contours
	`quiver()`	Direction field vectors

Perspective plots of surfaces over the x-y plane

R/S-Plus	Python	Description

`f <- function(x,y) x*exp(-x^2-y^2)`
`n <- seq(-2,2, length=40)`
`z <- outer(n,n,f)`
	`n=arrayrange(-2,2,.1)`
	`[x,y] = meshgrid(n,n)`
	`z = x*power(math.e,-x**2-y**2)`	

`persp(x,y,z,`
`theta=30, phi=30, expand=0.6,`
`ticktype='detailed')`
		Mesh plot

`persp(x,y,z,`
`theta=30, phi=30, expand=0.6,`
`col='lightblue', shade=0.75,`
`ltheta=120,`
`ticktype='detailed')`
		Surface plot

Scatter (cloud) plots

R/S-Plus	Python	Description
`cloud(z~x*y)`		3d scatter plot

Save plot to a graphics file

R/S-Plus	Python	Description

`postscript(file="foo.eps")`
`plot(1:10)`
`dev.off()`
	`savefig('foo.eps')`	PostScript

`pdf(file='foo.pdf')`	`savefig('foo.pdf')`	PDF
`devSVG(file='foo.svg')`	`savefig('foo.svg')`	SVG (vector graphics for www)
`png(filename = "Rplot%03d.png"`	`savefig('foo.png')`	PNG (raster graphics)

Data analysis

Set membership operators

R/S-Plus	Python	Description

`a <- c(1,2,2,5,2)`
`b <- c(2,3,4)`
	`a = array([1,2,2,5,2])`
	`b = array([2,3,4])`
	`a = set([1,2,2,5,2])`
	`b = set([2,3,4])`
		Create sets

`unique(a)`	`unique1d(a)`
	`unique(a)`
	`set(a)`
		Set unique

`union(a,b)`	`union1d(a,b)` `a.union(b)`	Set union
`intersect(a,b)`	`intersect1d(a)` `a.intersection(b)`	Set intersection
`setdiff(a,b)`	`setdiff1d(a,b)` `a.difference(b)`	Set difference

`setdiff(union(a,b),intersect(a,b))`	`setxor1d(a,b)` `a.symmetric_difference(b)`	Set exclusion

`is.element(2,a)` *or* `2 %in% a`	`2 in a`
	`setmember1d(2,a)`
	`contains(a,2)`
		True for set member

Statistics

R/S-Plus	Python	Description
`apply(a,2,mean)`	`a.mean(axis=0)` `mean(a [,axis=0])`	Average
`apply(a,2,median)`	`median(a)` *or* `median(a [,axis=0])`	Median
`apply(a,2,sd)`	`a.std(axis=0)` *or* `std(a [,axis=0])`	Standard deviation
`apply(a,2,var)`	`a.var(axis=0)` *or* `var(a)`	Variance
`cor(x,y)`	`correlate(x,y)` *or* `corrcoef(x,y)`	Correlation coefficient
`cov(x,y)`	`cov(x,y)`	Covariance

Interpolation and regression

R/S-Plus	Python	Description

`z <- lm(y~x)`
`plot(x,y)`
`abline(z)`
	`(a,b) = polyfit(x,y,1)`
	`plot(x,y,'o', x,a*x+b,'-')`
		Straight line fit

`solve(a,b)`	`linalg.lstsq(x,y)`	Linear least squares $y = ax + b$
	`polyfit(x,y,3)`	Polynomial fit

Non-linear methods

Polynomials, root finding

R/S-Plus	Python	Description
	`poly()`	Polynomial
`polyroot(c(1,-1,-1))`	`roots()`	Find zeros of polynomial
	`polyval(array([1,2,1,2]),arange(1,11))`	Evaluate polynomial

Differential equations

R/S-Plus	Python	Description
	`diff(x, n=1, axis=0)`	Discrete difference function and approximate derivative

Fourier analysis

R/S-Plus	Python	Description
`fft(a)`	`fft(a)` *or*	Fast fourier transform

`fft(a, inverse=TRUE)`	`ifft(a)` *or*	Inverse fourier transform
	`convolve(x,y)`	Linear convolution

Symbolic algebra; calculus

R/S-Plus Python Description

Programming

R/S-Plus	Python	Description
`.R`	`.py`	Script file extension
`#`	`#`	Comment symbol (rest of line)
`library(RSvgDevice)`	`from pylab import *`	Import library functions
`string <- "a <- 234"` `eval(parse(text=string))`	`string="a=234"` `eval(string)`	Eval

Loops

R/S-Plus	Python	Description
`for(i in 1:5) print(i)`	`for i in range(1,6): print(i)`	for-statement

`for(i in 1:5) {`
`print(i)`
`print(i*2)`
`}`
	`for i in range(1,6):`
	`print(i)`
	`print(i*2)`
		Multiline for statements

Conditionals

R/S-Plus	Python	Description
`if (1>0) a <- 100`	`if 1>0: a=100`	if-statement
`ifelse(a>0,a,0)`		Ternary operator (if?true:false)

Debugging

R/S-Plus	Python	Description
`.Last.value`		Most recent evaluated expression
`objects()`		List variables loaded into memory
`rm(x)`		Clear variable x from memory
`print(a)`	`print a`	Print

Working directory and OS

R/S-Plus	Python	Description
`list.files()` *or* `dir()`	`os.listdir(".")`	List files in directory
`list.files(pattern="\.r$")`	`grep.grep("*.py")`	List script files in directory

`getwd()`	`os.getcwd()`	Displays the current working directory
`setwd('foo')`	`os.chdir('foo')`	Change working directory
`system("notepad")`	`os.system('notepad')` `os.popen('notepad')`	Invoke a System Command