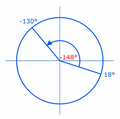
Math

arc_measure
Returns degrees between start and end angles



arccos
Given value between -1 and 1 returns arccosine in radians or degrees

area
Returns area of a closed polygon

24780.993461608887

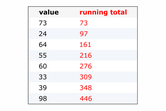
attractor
Computes minimum distance and angle from points to a shape

average
Given a list of numbers returns mean, median, mode(s), or mid-range

Index	trial	heads
0	1	1
1	4	3
2	11	5
3	2	5
4	9	5
5	10	5
6	6	6
7	3	6
8	8	6
9	5	6
10	1	6
11	5	6

Mean: 5.33
Median: 5.5
Mode(s): 5,6
Mid-range: 5.0

bounds
Constrain values within upper and/or lower bounds



easing
Applies selected easing function to produce changing values over time

find_radius
Finds radius of a polygon with a given side length

percentage
Returns percentage as number or formatted string

24.05%
33.32%
38.52%
55.04%
59.75%
63.74%
73.10%

precision
Rounds a floating point number to a given precision

3
3.1
3.14
3.142
3.1416
3.14159

primes
Generates a list of prime numbers up to a given limit

running_start
A running total that starts with the first value

value	running total
73	73
24	97
64	161
55	216
60	276
33	309
39	348
98	446

secs
Returns clock time in seconds since last call, use trigger to measure elapsed time - REQUIRES TIME.PY

Seconds needed to draw a polygon with one million sides: 1.594

sign
Return the sign of a number (-1, 0, or 1)

77.79	**1**
-44.95	**-1**
14.86	**1**
0.0	**0**
52.23	**1**
-87.92	**-1**

tangent
Returns precise tangent angle at any position (0 to 100) along a path

this_or_that
If which is 0 choose this, if which is 1 choose that

470.65
(176.38)
923.58
82.95
698.37

Geometry

align_labels
Align a column of labels

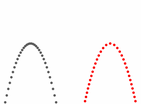
align_nums
Align and format a column of numbers centered on their decimal points

Q1	*475,350.23*
Q2	*20,885.50*
Q3	*(110,336.75)*
Q4	*930,512.92*
Total	*1,316,411.90*

apply_color
Colorize a shape based on the properties of a reference object

arrange
Arrange objects in tidy stacks

arrow
Draws an arrow with many style options



balloons
Draws a bunch of balloons, colored randomly if no colors are supplied

bound_box
Create a bounding rect around an object

canvas
Returns a white rectangle with width and height of current canvas - REQUIRES CANVAS.PY

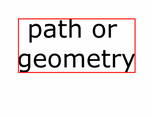
clean
Removes duplicate consecutive points in a path - fixes some artifacts in PNG exports

clip
Clips to boundary, restoring fill and stroke colorization

contours
Separates path into distinct contours

curve
Draws quadratic curve with two control points

diamonds
Create a grid of diamonds



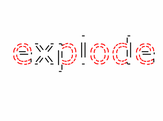
donut
Create a donut, pie, or stacked bar chart

draw_table
Draw a table below left to the data view of the input table

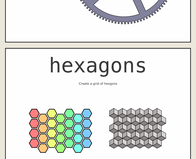
index	word	letters	width
0	every	5	65.2852
1	good	4	55.6055
2	boy	3	40.8398
3	does	4	54.0703
4	fine	4	42.5391

even_sample
Distribute points evenly across entire path, curves only, or joints only

explode
Explodes path into individual lines and curves



fade
Adjust alpha (0 to 100) of shapes or geometries



fancy_star
Create a well proportioned star shape with coloring options

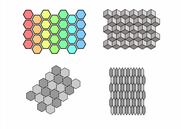
find_arc
Finds an arc between two points

fit_curve
Finds a curve that passes through all points in a path

fragments
Returns shapes arising in the spaces between overlapping shapes

gear
Create an adjustable, working gear

hexagons
Create a grid of hexagons



fragments
Returns shapes arising in the spaces between overlapping shapes

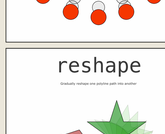
image
Opens an image file and returns sample or masked pattern as a pixel group - REQUIRES IMAGE.PY

Dimensions: 220.0 x 220.0
Pixels: 38,032
Pixel size: 1.0

join
Join a list of paths into a single seamless path

node_card
Creates specification card for each NodeBox node - REQUIRES NODELIST.PY

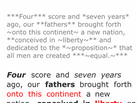
occlude
Create plottable paths from overlapping shapes in increasing Z order



overlaps
Return all possible intersections of up to ten overlapping shapes

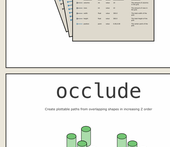
parabola
Create parabola curve for y = Ax^2 + Bx + C for x between X1 and X2

place_label
Size and place a text label inside an arbitrary shape



push_pull
Moves a subset of path's control points to alter its shape

rearrange
Move a list of points or shapes to a list of target positions over time

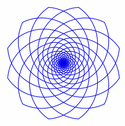


reshape
Gradually reshape one polyline path into another

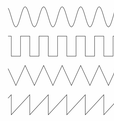
rev_dir
Reverse direction of a complex path

shutter
Creates a dynamic camera shutter

spiral
Draws different types of spirals



split
Splits a path into a list of paths at given locations



stack_tight
Arrange shapes tightly together in horizontal or vertical stacks

sub_path
Returns a portion of a complex path between two positions (0 to 100)

text_circle
Create a text path centered above or below a circle

text_svg
Creates a kerned single line text path based on SVG fonts - REQUIRES HersheyFont.svg

trace
Traces outline of a closed path

trajectory
Create a trajectory curve for a projectile with given angle, velocity, height, and gravity

treemap
Given list of values and bounding rect, returns a treemap as position of rect - REQUIRES TREEMAP.PY

triangle
Create a triangle by supplying three values, including at least one side

true_arc
Creates an directionally correct arc path for text to follow

true_spoke
Corrects text direction for text on a spoke path

unwind
Unwind a polyline path into a line or segmented curve

wave
Create a wave path

wiggle
Wiggle segments of path inside or outside mask

wind_letters
Winds letters around a spiral

Points

alt_grid
Create grid with options for alternating indents and zigzagging

circle_circle
Finds intersections between two circles

corner
Returns a corner or midpoint in the boundary of a shape

distinct_pts
Remove duplicate points within a given closeness

good_center
Find a reasonable center point inside a shape

grid_plus
Create a grid of points sized by cell width and height with options for a limit and different orders

intrsct_circle
Finds intersections between a line and an ellipse

intrsct_curve
Finds intersections between a line and a cubic bezier curve

intrsct_line
Finds intersection between two lines

intrsct_path
Finds intersections between a line and a path

order_LRTB
Order points or shapes left to right, top to bottom

outer_points
Returns the points which form a boundary enclosing the rest - REQUIRES CONVEX_HULL.PY

point_in_path
Calculate a point between beginning and end of a path

rel_change
Given start point A and end point B returns B-A, the point needed to translate A to B

scatter_evenly
Generates evenly spaced points within a rectangular area - REQUIRES POISSON.PY

true_center
Calculate the true center of a regular polygon, star, or fancy star

Lists

diff_list
Given lists A and B, returns items in A but not B, B but not A, or in both

List A only	List B only	A and B anagram
oranges	bears	
kiwis	carrots	B not A
carrots	grapefruit	grapefruit
apples	bananas	bananas
		A and B
		apples
		kiwis
		carrots

drop_last
Take all but the last item of a list

1 2 3 4

find_item
Returns all indices where target occurs in a source list

red
blue
green
blue
yellow

find_substr
Returns all indices of target substring within source string

That is a **bold** assertion!

indices
Returns a list of indices to enumerate items in the input list

list_files
Given folder path returns top level files in that folder - REQUIRES LIST_DIR.PY

python files	code lines
convert_hex.py	8
make_curve.py	9
docstyle.py	10
font_table.py	11
contours.py	13
time.py	14
canvas.py	17
write_table.py	32
list_dir.py	49
convex_hull.py	50
convert_base.py	51
nodelist.py	79
treemap.py	102
image.py	107
poisson.py	139

list_folders
Given folder path returns top level subfolders - REQUIRES LIST_DIR.PY

FOLDERS	FILES
96x colormaps	96x colormaps/Apple Series 1 1 Render.ndbx
96x colormaps/Apple Series 1 1.ndbx	96x colormaps/Apple Series 1 1.ndbx
Posters and Screenshots	96x colormaps/Apple Series 2 1 Render.ndbx
Utility Nodes	96x colormaps/Apple Series 2 1.ndbx
	96x colormaps/Apple Series 3 1 Render.ndbx
	96x colormaps/Apple Series 3 1.ndbx
	Posters and Screenshots/Screen Shot 2021-07-28 at 11.43.19 AM.png
	Posters and Screenshots/Screen Shot 2021-07-28 at 11.44.01 AM.png
	Posters and Screenshots/Node Library 3.0 Plan 2021.pdf
	Posters and Screenshots/Node Library 3.0 Plan 2021.png
	Posters and Screenshots/Safari Library 3.1 Poster.pdf
	Posters and Screenshots/Node Library 3.2 Screenshot.png
	Posters and Screenshots/Node Library 3.2 Screenshot.png
	Posters and Screenshots/Node Library 3.0 Screenshot.png
	Posters and Screenshots/Node Library 3.1 Poster.pdf
	Posters and Screenshots/Node Library 3.2 Poster.pdf
	Posters and Screenshots/Node Library 3.2 Arabic Screenshot.png
	Posters and Screenshots/Node Library 3.2 Poster.pdf
	Posters and Screenshots/Node Library Screenshot.png
	Posters and Screenshots/Node Library 3.3 Poster.pdf
	Posters and Screenshots/Node Library 3.3 poster.png
	Posters and Screenshots/Node Library 3.3 poster.pdf
	Posters and Screenshots/Node Library 3.3 poster.pdf
	Posters and Screenshots/Node Library 3.2 Set 2019.pdf

time
Returns local date, time, and day as list - REQUIRES TIME.PY

Data

change_col
Replace a column with modified data or add new one

country	month	average sales
India	January	572.1666666666666
India	February	518.4857142857143
India	March	571.6756818537879
Brazil	January	572.1666666666666
Brazil	February	521.7567567567568
Brazil	March	599.4942528735634

country	month	sales
India	January	572
India	February	518
India	March	571
Brazil	January	572
Brazil	February	836
Brazil	March	600

diff_table
Given tables A and B, returns rows with items in A but not B, B but not A, or both A and B

Fruit
apples
oranges
kiwis
carrots

Fruit
apples
kiwis
carrots
grapefruit
bananas

Fruit
oranges
bananas

Fruit
apples
kiwis
carrots

distribution
Makes distribution table from a source table, key, and range of possible values

heads	total
0	0
1	8
2	47
3	114
4	211
5	226
6	228
7	117
8	36
9	10
10	2

drop_cols
Drop or keep a subset of columns

country	month	apples	oranges	bananas
India	January	572	191	130
India	March	235	220	127
Brazil	January	572	191	130
Brazil	February	127	78	95
Brazil	March	58	112	17

country	month	bananas
India	January	55
India	February	130
India	March	127
Brazil	January	55
Brazil	February	86
Brazil	March	17

font_table
Returns a table of system fonts - REQUIRES FONT_TABLE.PY

family	name
.AppleSystemUIFont	.SFNS Regular
.AppleSystemUIFont Extra Bold	.SFNS Regular Condensed Extra Bold
.AppleSystemUIFont Extra Bold	.SFNS Regular Condensed Light
.AppleSystemUIFont Light	.SFNS Regular Expanded Light
Academy Engraved LET	.SFNS Regular Expanded LetPlain
Adobe Caslon Pro	.SFNS Regular Italic
Adobe Caslon Pro	.SFNS Regular Small Caps
Adobe Caslon Pro	.SFNS Regular Subscript
Adobe Caslon Pro	.SFNS Regular Superior
Adobe Caslon Pro	.SFNS Regular Swash
Adobe Caslon Pro	.SFNS Regular Titling
Adobe Caslon Pro	.SFNS Regular Titling Swash
Adobe Fangsong Std	.SFNS Rounded Regular
Adobe Fangsong Std	.SFNS Rounded Semibold
Adobe Garamond Pro	.SFNS Rounded Thin
Adobe Garamond Pro	.SFNS Text Regular
Adobe Garamond Pro	.SFNS Text Semibold
Adobe Garamond Pro	.SFNS Text Thin
Adobe Garamond Pro	AbadiMTCondensed Extra Bold
Adobe Garamond Pro	AbadiMTCondensed Light
Adobe Garamond Pro	AbadiMTCondensed Regular
Adobe Garamond Pro	Academy Engraved LET
Adobe Garamond Pro	Adelle Bold
Adobe Garamond Pro	Adelle Bold Italic
Adobe Garamond Pro	Adelle Italic
Adobe Garamond Pro	Adelle Light
Adobe Garamond Pro	Adelle Light Italic
Adobe Garamond Pro	Adelle Regular
Adobe Garamond Pro	Adelle Regular Italic
Adobe Garamond Pro	Adelle Semibold
Adobe Garamond Pro	Adelle Semibold Italic
Adobe Garamond Pro	AdelleSans Bold
Adobe Garamond Pro	AdelleSans Bold Italic
Adobe Garamond Pro	AdelleSans Italic
Adobe Garamond Pro	AdelleSans Light
Adobe Garamond Pro	AdelleSans Light Italic
Adobe Garamond Pro	AdelleSans Regular
Adobe Garamond Pro	AdelleSans Regular Italic
Adobe Garamond Pro	AdelleSans Semibold
Adobe Garamond Pro	AdelleSans Semibold Italic
Adobe Garamond Pro	Agency FB Bold
Adobe Garamond Pro	Agency FB Regular
Adobe Garamond Pro	Al Bayan Bold
Adobe Garamond Pro	Al Bayan Plain
Adobe Garamond Pro	Al Nile Bold
Adobe Garamond Pro	Al Nile Regular
Adobe Garamond Pro	Al Tarikh Regular
Adobe Garamond Pro	Algerian Regular
Adobe Garamond Pro	American Typewriter Bold
Adobe Garamond Pro	American Typewriter Condensed Bold
Adobe Garamond Pro	American Typewriter Condensed Light
Adobe Garamond Pro	American Typewriter Condensed Regular
Adobe Garamond Pro	American Typewriter Light
Adobe Garamond Pro	American Typewriter Regular
Adobe Garamond Pro	American Typewriter Semibold
Adobe Garamond Pro	Andale Mono Regular
Adobe Garamond Pro	Andalus Regular
Adobe Garamond Pro	Angsana New Bold
Adobe Garamond Pro	Angsana New Bold Italic
Adobe Garamond Pro	Angsana New Italic
Adobe Garamond Pro	Angsana New Regular
Adobe Garamond Pro	AngsanaUPC Bold
Adobe Garamond Pro	AngsanaUPC Bold Italic
Adobe Garamond Pro	AngsanaUPC Italic
Adobe Garamond Pro	AngsanaUPC Regular
Adobe Garamond Pro	Apple Braille Outline 6 Dot
Adobe Garamond Pro	Apple Braille Outline 8 Dot
Adobe Garamond Pro	Apple Braille Pinpoint 6 Dot
Adobe Garamond Pro	Apple Braille Pinpoint 8 Dot
Adobe Garamond Pro	Apple Chancery
Adobe Garamond Pro	Apple Color Emoji
Adobe Garamond Pro	Apple LiGothic Medium
Adobe Garamond Pro	Apple LiSung Light
Adobe Garamond Pro	Apple SD Gothic Neo Bold
Adobe Garamond Pro	Apple SD Gothic Neo Regular
Adobe Garamond Pro	Apple SD Gothic Neo Thin
Adobe Garamond Pro	Apple Symbols
Adobe Garamond Pro	AppleGothic Regular
Adobe Garamond Pro	AppleMyungjo Regular
Adobe Garamond Pro	Arabic Typesetting Regular
Adobe Garamond Pro	Arial Bold
Adobe Garamond Pro	Arial Bold Italic
Adobe Garamond Pro	Arial Italic
Adobe Garamond Pro	Arial Narrow
Adobe Garamond Pro	Arial Narrow Bold
Adobe Garamond Pro	Arial Narrow Bold Italic
Adobe Garamond Pro	Arial Narrow Italic
Adobe Garamond Pro	Arial Rounded MT Bold
Adobe Garamond Pro	Arial Unicode MS
Adobe Garamond Pro	Athelas Bold
Adobe Garamond Pro	Athelas Bold Italic
Adobe Garamond Pro	Athelas Italic
Adobe Garamond Pro	Athelas Regular
Adobe Garamond Pro	Avenir Black
Adobe Garamond Pro	Avenir Black Oblique
Adobe Garamond Pro	Avenir Book
Adobe Garamond Pro	Avenir Book Oblique
Adobe Garamond Pro	Avenir Heavy
Adobe Garamond Pro	Avenir Heavy Oblique
Adobe Garamond Pro	Avenir Light
Adobe Garamond Pro	Avenir Light Oblique
Adobe Garamond Pro	Avenir Medium
Adobe Garamond Pro	Avenir Medium Oblique
Adobe Garamond Pro	Avenir Next Bold
Adobe Garamond Pro	Avenir Next Bold Italic
Adobe Garamond Pro	Avenir Next Condensed Bold
Adobe Garamond Pro	Avenir Next Condensed Bold Italic
Adobe Garamond Pro	Avenir Next Condensed Demi Bold
Adobe Garamond Pro	Avenir Next Condensed Demi Bold Italic
Adobe Garamond Pro	Avenir Next Condensed Heavy
Adobe Garamond Pro	Avenir Next Condensed Heavy Italic
Adobe Garamond Pro	Avenir Next Condensed Italic
Adobe Garamond Pro	Avenir Next Condensed Medium
Adobe Garamond Pro	Avenir Next Condensed Medium Italic
Adobe Garamond Pro	Avenir Next Condensed Regular
Adobe Garamond Pro	Avenir Next Condensed Ultra Light
Adobe Garamond Pro	Avenir Next Condensed Ultra Light Italic
Adobe Garamond Pro	Avenir Next Demi Bold
Adobe Garamond Pro	Avenir Next Demi Bold Italic
Adobe Garamond Pro	Avenir Next Heavy
Adobe Garamond Pro	Avenir Next Heavy Italic
Adobe Garamond Pro	Avenir Next Italic
Adobe Garamond Pro	Avenir Next Medium
Adobe Garamond Pro	Avenir Next Medium Italic
Adobe Garamond Pro	Avenir Next Regular
Adobe Garamond Pro	Avenir Next Ultra Light
Adobe Garamond Pro	Avenir Next Ultra Light Italic
Adobe Garamond Pro	Avenir Oblique
Adobe Garamond Pro	Avenir Roman
Adobe Garamond Pro	Ayuthaya
Adobe Garamond Pro	Baghdad
Adobe Garamond Pro	Bangla MN Bold
Adobe Garamond Pro	Bangla MN Regular
Adobe Garamond Pro	Bangla Sangam MN Bold
Adobe Garamond Pro	Bangla Sangam MN Regular
Adobe Garamond Pro	Baoli SC Regular
Adobe Garamond Pro	Baskerville Bold
Adobe Garamond Pro	Baskerville Bold Italic
Adobe Garamond Pro	Baskerville Italic
Adobe Garamond Pro	Baskerville Regular
Adobe Garamond Pro	Beirut Regular
Adobe Garamond Pro	Bell MT Bold
Adobe Garamond Pro	Bell MT Italic
Adobe Garamond Pro	Bell MT Regular
Adobe Garamond Pro	Bembo Bold
Adobe Garamond Pro	Bembo Bold Italic
Adobe Garamond Pro	Bembo Italic
Adobe Garamond Pro	Bembo Regular
Adobe Garamond Pro	Bembo Semibold
Adobe Garamond Pro	Bembo Semibold Italic
Adobe Garamond Pro	Bembo Std Bold
Adobe Garamond Pro	Bembo Std Bold Italic
Adobe Garamond Pro	Bembo Std Italic
Adobe Garamond Pro	Bembo Std Regular
Adobe Garamond Pro	Bembo Std Semibold
Adobe Garamond Pro	Bembo Std Semibold Italic
Adobe Garamond Pro	Bembo Std Titling Bold
Adobe Garamond Pro	Bembo Std Titling Bold Italic
Adobe Garamond Pro	Bembo Std Titling Italic
Adobe Garamond Pro	Bembo Std Titling Regular
Adobe Garamond Pro	Bembo Std Titling Semibold
Adobe Garamond Pro	Bembo Std Titling Semibold Italic
Adobe Garamond Pro	Bembo Titling Bold
Adobe Garamond Pro	Bembo Titling Bold Italic
Adobe Garamond Pro	Bembo Titling Italic
Adobe Garamond Pro	Bembo Titling Regular
Adobe Garamond Pro	Bembo Titling Semibold
Adobe Garamond Pro	Bembo Titling Semibold Italic
Adobe Garamond Pro	Bernard MT Condensed
Adobe Garamond Pro	Big Caslon Medium
Adobe Garamond Pro	Blackmoor LET Plain
Adobe Garamond Pro	Bodoni 72 Bold
Adobe Garamond Pro	Bodoni 72 Bold Italic
Adobe Garamond Pro	Bodoni 72 Book
Adobe Garamond Pro	Bodoni 72 Book Italic
Adobe Garamond Pro	Bodoni 72 Oldstyle Bold
Adobe Garamond Pro	Bodoni 72 Oldstyle Bold Italic
Adobe Garamond Pro	Bodoni 72 Oldstyle Book
Adobe Garamond Pro	Bodoni 72 Oldstyle Book Italic
Adobe Garamond Pro	Bodoni 72 Smallcaps Book
Adobe Garamond Pro	Bodoni Ornaments
Adobe Garamond Pro	Bodoni SvtyTwo ITC TT Bold
Adobe Garamond Pro	Bodoni SvtyTwo ITC TT Bold Italic
Adobe Garamond Pro	Bodoni SvtyTwo ITC TT Book
Adobe Garamond Pro	Bodoni SvtyTwo ITC TT Book Italic
Adobe Garamond Pro	Bodoni SvtyTwo OS ITC TT Bold
Adobe Garamond Pro	Bodoni SvtyTwo OS ITC TT Bold Italic
Adobe Garamond Pro	Bodoni SvtyTwo OS ITC TT Book
Adobe Garamond Pro	Bodoni SvtyTwo OS ITC TT Book Italic
Adobe Garamond Pro	Bodoni SvtyTwo SC ITC TT Book
Adobe Garamond Pro	Bodoni SvtyTwo SC ITC TT Book Italic
Adobe Garamond Pro	Book Antiqua Bold
Adobe Garamond Pro	Book Antiqua Bold Italic
Adobe Garamond Pro	Book Antiqua Italic
Adobe Garamond Pro	Book Antiqua Regular
Adobe Garamond Pro	Bookman Old Style Bold
Adobe Garamond Pro	Bookman Old Style Bold Italic
Adobe Garamond Pro	Bookman Old Style Italic
Adobe Garamond Pro	Bookman Old Style Regular
Adobe Garamond Pro	Bordeaux Roman Bold
Adobe Garamond Pro	Bordeaux Roman Bold Italic
Adobe Garamond Pro	Bordeaux Roman Italic
Adobe Garamond Pro	Bordeaux Roman Regular
Adobe Garamond Pro	Brandon Grotesque Black
Adobe Garamond Pro	Brandon Grotesque Black Italic
Adobe Garamond Pro	Brandon Grotesque Bold
Adobe Garamond Pro	Brandon Grotesque Bold Italic
Adobe Garamond Pro	Brandon Grotesque Italic
Adobe Garamond Pro	Brandon Grotesque Light
Adobe Garamond Pro	Brandon Grotesque Light Italic
Adobe Garamond Pro	Brandon Grotesque Medium
Adobe Garamond Pro	Brandon Grotesque Medium Italic
Adobe Garamond Pro	Brandon Grotesque Regular
Adobe Garamond Pro	Brandon Grotesque Thin
Adobe Garamond Pro	Brandon Grotesque Thin