# matplotlib.axes.Axes.plot

**Axes.plot(**args, scalex=True, scaley=True, data=None, **kwargs*)** [source]

Plot y versus x as lines and/or markers.

Call signatures:

```
plot([x], y, [fmt], *, data=None, **kwargs)
plot([x], y, [fmt], [x2], y2, [fmt2], ..., **kwargs)
```

The coordinates of the points or line nodes are given by *x*, *y*.

The optional parameter *fmt* is a convenient way for defining basic formatting like color, marker and linestyle. It's a shortcut string notation described in the *Notes* section below.

```
>>> plot(x, y)        # plot x and y using default line style and color
>>> plot(x, y, 'bo')  # plot x and y using blue circle markers
>>> plot(y)           # plot y using x as index array 0..N-1
>>> plot(y, 'r+')     # ditto, but with red plusses
```

You can use `Line2D` properties as keyword arguments for more control on the appearance. Line properties and *fmt* can be mixed. The following two calls yield identical results:

```
>>> plot(x, y, 'go--', linewidth=2, markersize=12)
>>> plot(x, y, color='green', marker='o', linestyle='dashed',
...      linewidth=2, markersize=12)
```

When conflicting with *fmt*, keyword arguments take precedence.

**Plotting labelled data**

There's a convenient way for plotting objects with labelled data (i.e. data that can be accessed by index `obj['y']`). Instead of giving the data in *x* and *y*, you can provide the object in the *data* parameter and just give the labels for *x* and *y*:

```
>>> plot('xlabel', 'ylabel', data=obj)
```

All indexable objects are supported. This could e.g. be a `dict`, a `pandas.DataFrame` or a structured numpy array.

**Plotting multiple sets of data**

There are various ways to plot multiple sets of data.

- The most straight forward way is just to call `plot` multiple times. Example:

  ```
  >>> plot(x1, y1, 'bo')
  >>> plot(x2, y2, 'go')
  ```

- If *x* and/or *y* are 2D arrays a separate data set will be drawn for every column. If both *x* and *y* are 2D, they must have the same shape. If only one of them is 2D with shape (N, m) the other must have length N and will be used for every data set m.

  Example:

  ```
  >>> x = [1, 2, 3]
  >>> y = np.array([[1, 2], [3, 4], [5, 6]])
  >>> plot(x, y)
  ```

  is equivalent to:

  ```
  >>> for col in range(y.shape[1]):
  ...     plot(x, y[:, col])
  ```

- The third way is to specify multiple sets of *[x]*, *y*, *[fmt]* groups:

  ```
  >>> plot(x1, y1, 'g^', x2, y2, 'g-')
  ```

  In this case, any additional keyword argument applies to all datasets. Also this syntax cannot be combined with the *data* parameter.

By default, each line is assigned a different style specified by a 'style cycle'. The *fmt* and line property parameters are only necessary if you want explicit deviations from these defaults. Alternatively, you can also change the style cycle using `rcParams["axes.prop_cycle"]` (default: `cycler('color', ['#1f77b4', '#ff7f0e', '#2ca02c', '#d62728', '#9467bd', '#8c564b', '#e377c2', '#7f7f7f', '#bcbd22', '#17becf'])`).

**Parameters:**

**x, y** : ***array-like or scalar***

The horizontal / vertical coordinates of the data points. *x* values are optional and default to `range(len(y))`.

Commonly, these parameters are 1D arrays.

They can also be scalars, or two-dimensional (in that case, the columns represent separate data sets).

These arguments cannot be passed as keywords.

**fmt** : ***str, optional***

A format string, e.g. 'ro' for red circles. See the *Notes* section for a full description of the format strings.

Format strings are just an abbreviation for quickly setting basic line properties. All of these and more can also be controlled by keyword arguments.

This argument cannot be passed as keyword.

**data** : ***indexable object, optional***

An object with labelled data. If given, provide the label names to plot in *x* and *y*.

> **Note**
>
> Technically there's a slight ambiguity in calls where the second label is a valid *fmt*. `plot('n', 'o', data=obj)` could be `plt(x, y)` or `plt(y, fmt)`. In such cases, the former interpretation is chosen, but a warning is issued. You may suppress the warning by adding an empty format string `plot('n', 'o', '', data=obj)`.

**Returns:**

**list of** `Line2D`

A list of lines representing the plotted data.

**Other Parameters:** **scalex, scaley : *bool, default: True***

These parameters determine if the view limits are adapted to the data limits. The values are passed on to `autoscale_view`.

****kwargs : *`Line2D` properties, optional***

*kwargs* are used to specify properties like a line label (for auto legends), linewidth, antialiasing, marker face color. Example:

```
>>> plot([1, 2, 3], [1, 2, 3], 'go-', label='line 1', linewidth=2)
>>> plot([1, 2, 3], [1, 4, 9], 'rs', label='line 2')
```

If you specify multiple lines with one plot call, the kwargs apply to all those lines. In case the label object is iterable, each element is used as labels for each set of data.

Here is a list of available `Line2D` properties:

| Property | Description |
|---|---|
| `agg_filter` | a filter function, which takes a (m, n, 3) float array and a dpi value, and returns a (m, n, 3) array |
| `alpha` | scalar or None |
| `animated` | bool |
| `antialiased` or aa | bool |
| `clip_box` | `Bbox` |
| `clip_on` | bool |
| `clip_path` | Patch or (Path, Transform) or None |
| `color` or c | color |
| `dash_capstyle` | `CapStyle` or {'butt', 'projecting', 'round'} |
| `dash_joinstyle` | `JoinStyle` or {'miter', 'round', 'bevel'} |
| `dashes` | sequence of floats (on/off ink in points) or (None, None) |
| `data` | (2, N) array or two 1D arrays |
| `drawstyle` or ds | {'default', 'steps', 'steps-pre', 'steps-mid', 'steps-post'}, default: 'default' |
| `figure` | `Figure` |
| `fillstyle` | {'full', 'left', 'right', 'bottom', 'top', 'none'} |
| `gid` | str |
| `in_layout` | bool |
| `label` | object |
| `linestyle` or ls | {'-', '--', '-.', ':', '', (offset, on-off-seq), ...} |
| `linewidth` or lw | float |
| `marker` | marker style string, `Path` or `MarkerStyle` |
| `markeredgecolor` or mec | color |
| `markeredgewidth` or mew | float |
| `markerfacecolor` or mfc | color |
| `markerfacecoloralt` or mfcalt | color |
| `markersize` or ms | float |
| `markevery` | None or int or (int, int) or slice or list[int] or float or (float, float) or list[bool] |
| `path_effects` | `AbstractPathEffect` |
| `picker` | float or callable[[Artist, Event], tuple[bool, dict]] |
| `pickradius` | float |
| `rasterized` | bool |
| `sketch_params` | (scale: float, length: float, randomness: float) |
| `snap` | bool or None |
| `solid_capstyle` | `CapStyle` or {'butt', 'projecting', 'round'} |
| `solid_joinstyle` | `JoinStyle` or {'miter', 'round', 'bevel'} |
| `transform` | unknown |
| `url` | str |
| `visible` | bool |
| `xdata` | 1D array |
| `ydata` | 1D array |
| `zorder` | float |

**See also**

`scatter`
XY scatter plot with markers of varying size and/or color ( sometimes also called bubble chart).

**Notes**

**Format Strings**

A format string consists of a part for color, marker and line:

```
fmt = '[marker][line][color]'
```

Each of them is optional. If not provided, the value from the style cycle is used. Exception: If `line` is given, but no `marker`, the data will be a line without markers.

Other combinations such as `[color][marker][line]` are also supported, but note that their parsing may be ambiguous.

**Markers**

| character | description |
|---|---|
| `'.'` | point marker |
| `','` | pixel marker |
| `'o'` | circle marker |
| `'v'` | triangle_down marker |
| `'^'` | triangle_up marker |
| `'<'` | triangle_left marker |
| `'>'` | triangle_right marker |
| `'1'` | tri_down marker |
| `'2'` | tri_up marker |
| `'3'` | tri_left marker |
| `'4'` | tri_right marker |
| `'8'` | octagon marker |
| `'s'` | square marker |
| `'p'` | pentagon marker |
| `'P'` | plus (filled) marker |
| `'*'` | star marker |
| `'h'` | hexagon1 marker |
| `'H'` | hexagon2 marker |
| `'+'` | plus marker |
| `'x'` | x marker |
| `'X'` | x (filled) marker |
| `'D'` | diamond marker |
| `'d'` | thin_diamond marker |
| `'\|'` | vline marker |
| `'_'` | hline marker |

**Line Styles**

| character | description |
|---|---|
| `'-'` | solid line style |
| `'--'` | dashed line style |

| character | description |
|---|---|
| `'-.'` | dash-dot line style |
| `':'` | dotted line style |

Example format strings:

```
'b'    # blue markers with default shape
'or'   # red circles
'-g'   # green solid line
'--'   # dashed line with default color
'^k:'  # black triangle_up markers connected by a dotted line
```

**Colors**

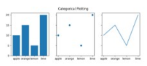
The supported color abbreviations are the single letter codes

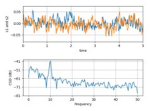
| character | color |
|---|---|
| `'b'` | blue |
| `'g'` | green |
| `'r'` | red |
| `'c'` | cyan |
| `'m'` | magenta |
| `'y'` | yellow |
| `'k'` | black |
| `'w'` | white |

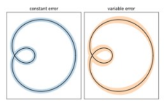
and the `'CN'` colors that index into the default property cycle.

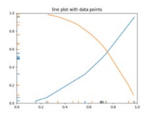
If the color is the only part of the format string, you can additionally use any `matplotlib.colors` spec, e.g. full names (`'green'`) or hex strings (`'#008000'`).

## Examples using `matplotlib.axes.Axes.plot`

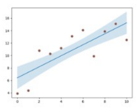

Plotting categorical variables

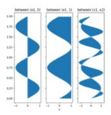

CSD Demo

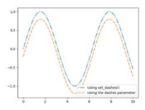

Curve with error band

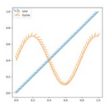

EventCollection Demo

Fill Between and Alpha

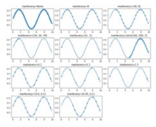

Filling the area between lines

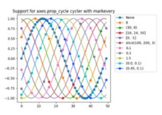

Fill Betweenx Demo

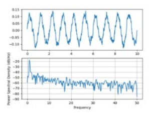

Customizing dashed line styles

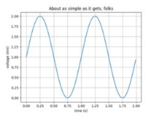

Lines with a ticked patheffect

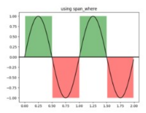
Marker reference

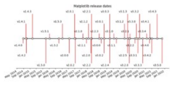

Markevery Demo

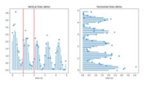

prop_cycle property markevery in rcParams

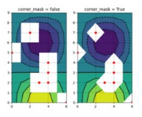

Psd Demo

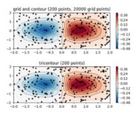

Simple Plot


Using span_where



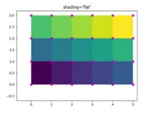


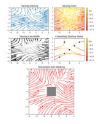


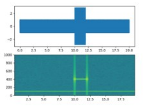


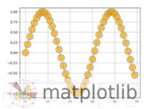
with lines, dates, and text

irregularly spaced data

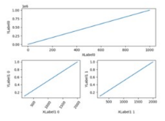

pcolormesh grids and shading

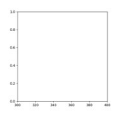

Streamplot

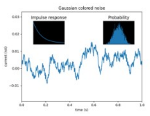

Spectrogram Demo

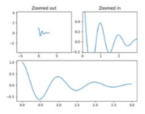


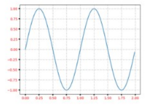
Watermark image

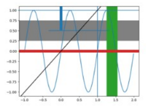

Aligning Labels

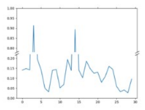

Axes box aspect

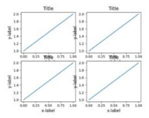

Axes Demo

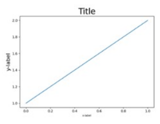

Controlling view limits using margins and sticky_edges


Axes Props


axhspan Demo


Broken Axis


Resizing axes with constrained layout



Resizing axes with tight layout

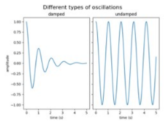
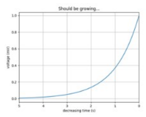
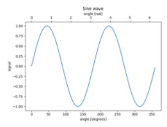
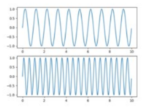


Figure labels: suptitle, supxlabel, supylabel


Invert Axes


Secondary Axis


Sharing axis limits and views

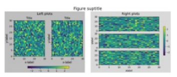
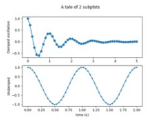
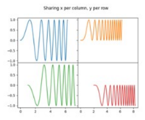
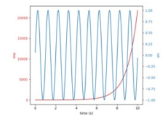
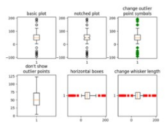


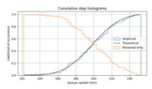
Figure subfigures

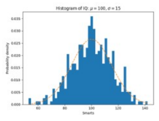

Multiple subplots

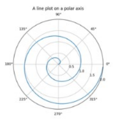

Creating multiple subplots using plt.subplots

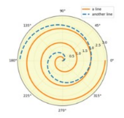

Plots with different scales

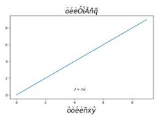

Boxplots

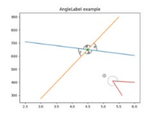

Using histograms to plot a cumulative distribution

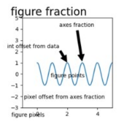

Some features of the histogram (hist) function


Polar plot

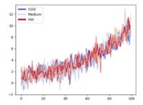

Polar Legend


Using accented text in matplotlib

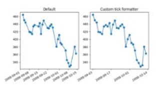

Scale invariant angle label

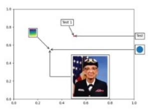


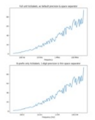
Annotating Plots


Composing Custom Legends

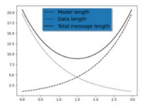
Date tick labels

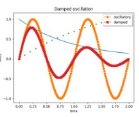

Custom tick formatter for time series

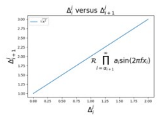

AnnotationBbox demo

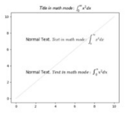

Labeling ticks using engineering notation

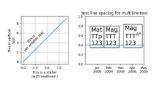
Annotation arrow style reference



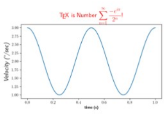


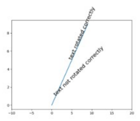


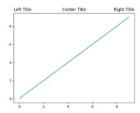


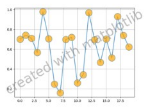


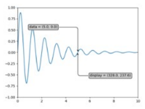
defined labels

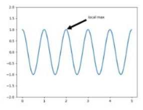

Rendering math equations using TeX

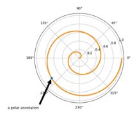

Text Rotation Relative To Line

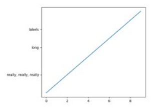

Title positioning

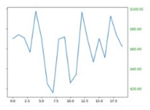

Text watermark

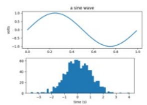

Annotate Transform

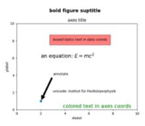

Annotating a plot

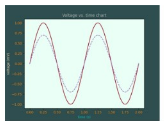

Annotation Polar

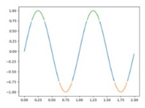

Programmatically controlling subplot adjustment

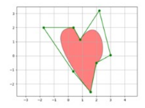

Dollar Ticks

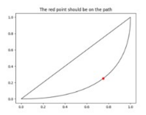

Simple axes labels

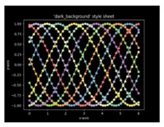

Text Commands

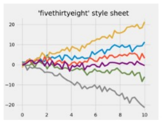

Color Demo

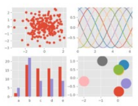

Color by y-value

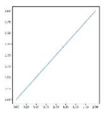

PathPatch object

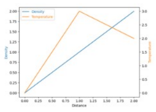

Bezier Curve

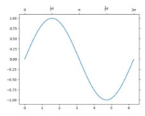

Dark background style sheet

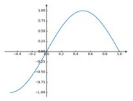

FiveThirtyEight style sheet

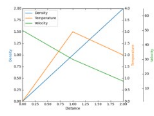

ggplot style sheet

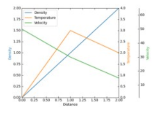

Axes with a fixed physical size

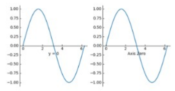

Parasite Simple

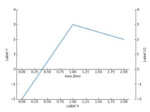

Simple Axisline4

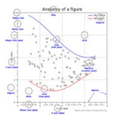

Axis line styles

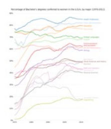

Parasite Axes demo

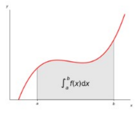

Parasite axis demo

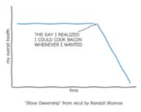

Custom spines with axisartist

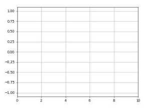

Simple Axisline

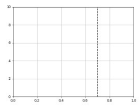

Anatomy of a figure

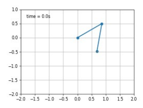

Bachelor's degrees by gender

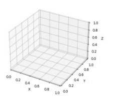

Integral as the area under a curve

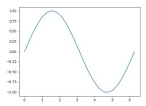

XKCD

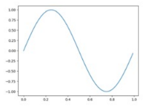

Decay

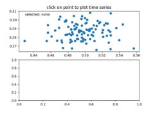

The Bayes update

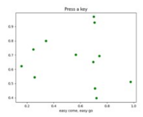

The double pendulum problem

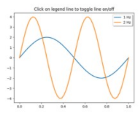

Animated 3D random walk


Animated line plot

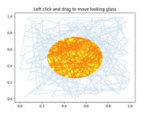


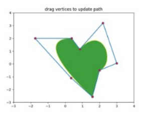


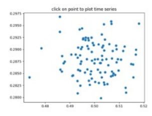


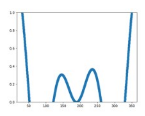


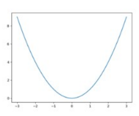
UNCHAINED events

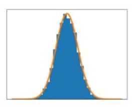

Looking Glass

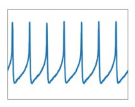

Path Editor

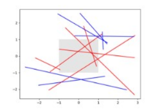

Pick Event Demo2

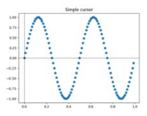

Resampling Data

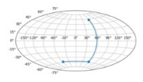

Timers

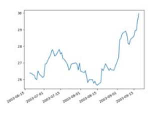

Frontpage histogram example

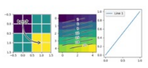

Frontpage plot example

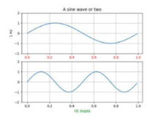

Changing colors of lines intersecting a box

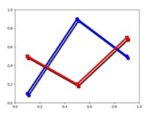

Cross hair cursor

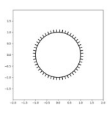

Custom projection

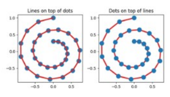

Load converter

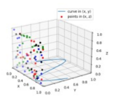

Patheffect Demo

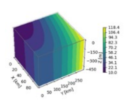

Pythonic Matplotlib

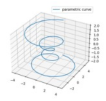

SVG Filter Line

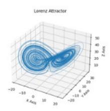

TickedStroke patheffect

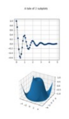

Zorder Demo

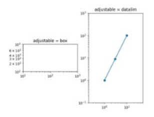

Plot 2D data on 3D plot

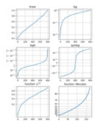

3D box surface plot

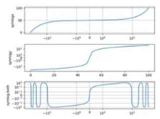

Parametric Curve

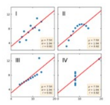

Lorenz Attractor

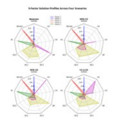

2D and 3D Axes in same Figure

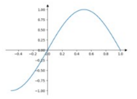

Loglog Aspect

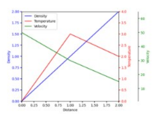

Scales

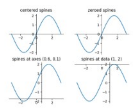

Symlog Demo

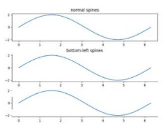

Anscombe's quartet

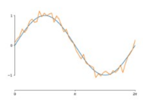

Radar chart (aka spider or star chart)

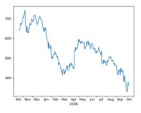

Centered spines with arrows

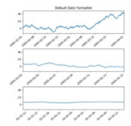

Multiple Yaxis With Spines

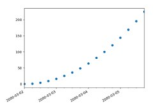

Spine Placement

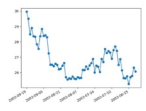

Spines

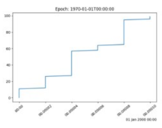

Custom spine bounds

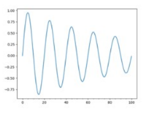

Centering labels between ticks

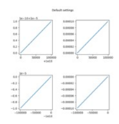

Formatting date ticks using ConciseDateFormatter

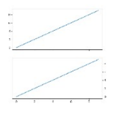

Date Demo Convert

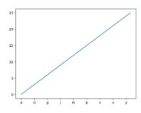

Date Index Formatter









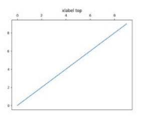


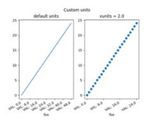
Epochs

formatter

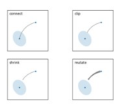
labels on the right

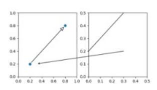
a list of values

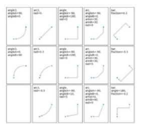

Set default x-axis tick labels on the top


Evans test

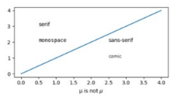
CanvasAgg demo

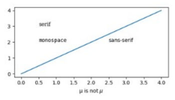

Annotate Explain

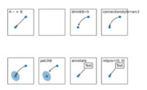

Connect Simple01

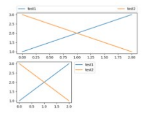

Connection styles for annotations

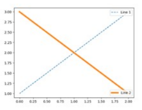
Nested GridSpecs

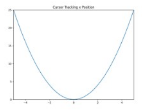

Pgf Fonts

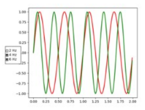

Pgf Texsystem

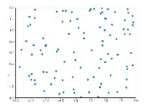

Simple Annotate01

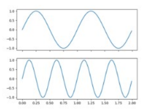

Simple Legend01

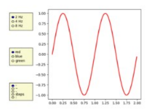

Simple Legend02

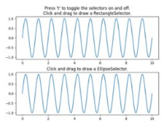

Annotated Cursor

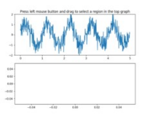

Check Buttons

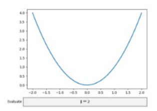

Cursor

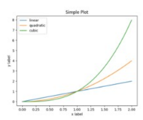

Multicursor

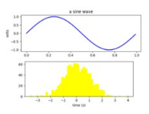

Radio Buttons

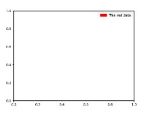

Rectangle and ellipse selectors

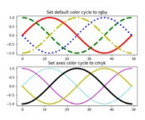

Span Selector

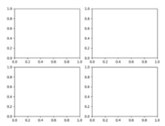

Textbox

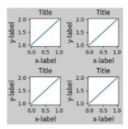

Usage Guide

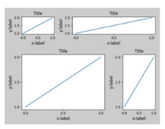

Artist tutorial

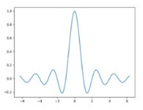

Legend guide

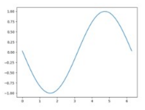

Styling with cycler

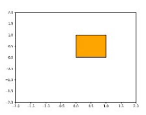

Customizing Figure Layouts Using GridSpec and Other Functions

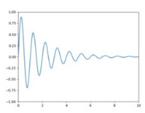

Constrained Layout Guide

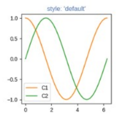

Tight Layout guide

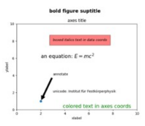

Autoscaling

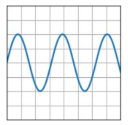

Faster rendering by using blitting

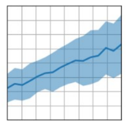

Path Tutorial

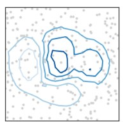

Transformations Tutorial

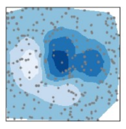

Specifying Colors

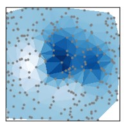

Text in Matplotlib Plots


plot(x, y)


fill_between(x, y1, y2)







tricontour(x, y, z) tricontourf(x, y, z) tripcolor(x, y, z)