To plot XKCD-style graphs, you must install the required font and refresh the font cache.

```
sudo apt install fonts-humor-sans
rm -fr ~/.cache/matplotlib
sudo fc-cache -f -v
```

If you don't plan to ever plot XKCD-style graphs, you can ignore this step.

Open the file 'customplot.py'. This is where you will enter the code for plotting graphs. Somewhere at the top of the file, you should see something like this.

`matplotlib.rcParams['savefig.directory'] = ...`

Delete this line.

Jump to the bottom of the file, and start scrolling upwards from there. You'll see `def main():` which is called the main function. This where you must enter your code. In the following pages, I have added some example codes for the main function. Just changing the main function is enough to get the code running. (If you are adventurous, you can experiment with changing other things in the file.)

To run the program, enter the command `python3 customplot.py` on the command line.

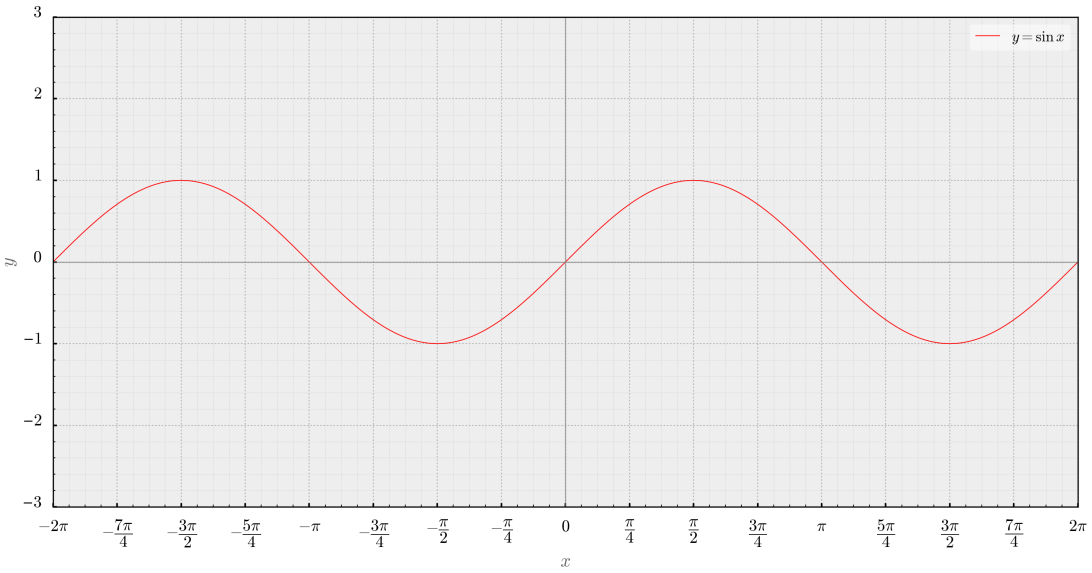

Figure 1: Cosine

```
def main():
    grapher = CustomPlot(dim = '2d', aspect_ratio = 1, xkcd = False)
    x1 = np.linspace(-32, 32, 100000)
    y1 = np.sin(x1)
    grapher.plot(x1, y1, color = 'red', label = r'$y=\sin\,x$')
    grapher.configure(axis_labels = ('$x$', '$y$', '$z$'), title = None)
    grapher.axis_fix(axis     = 'x',
                     symbolic = True,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -2,
                     last     = 2,
                     step     = 1 / 4)
    grapher.axis_fix(axis     = 'y',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -3,
                     last     = 3,
                     step     = 1)
    grapher.fig.tight_layout(pad = 2)
    plt.show()
```

Listing 1: Sine

```
def main():
    grapher = CustomPlot(dim = '2d', aspect_ratio = 1, xkcd = False)
    x1 = np.linspace(-32, 32, 100000)
    y1 = np.sqrt(x1)
    grapher.plot(x1, y1, color = 'red', label = r'$y=\sqrt{x}$')
    grapher.configure(axis_labels = ('$x$', '$y$', '$z$'), title = None)
    grapher.axis_fix(axis     = 'x',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -2,
                     last     = 10,
                     step     = 1)
    grapher.axis_fix(axis     = 'y',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -2,
                     last     = 4,
                     step     = 1)
    grapher.fig.tight_layout(pad = 2)
    plt.show()
```

Listing 2: Square Root

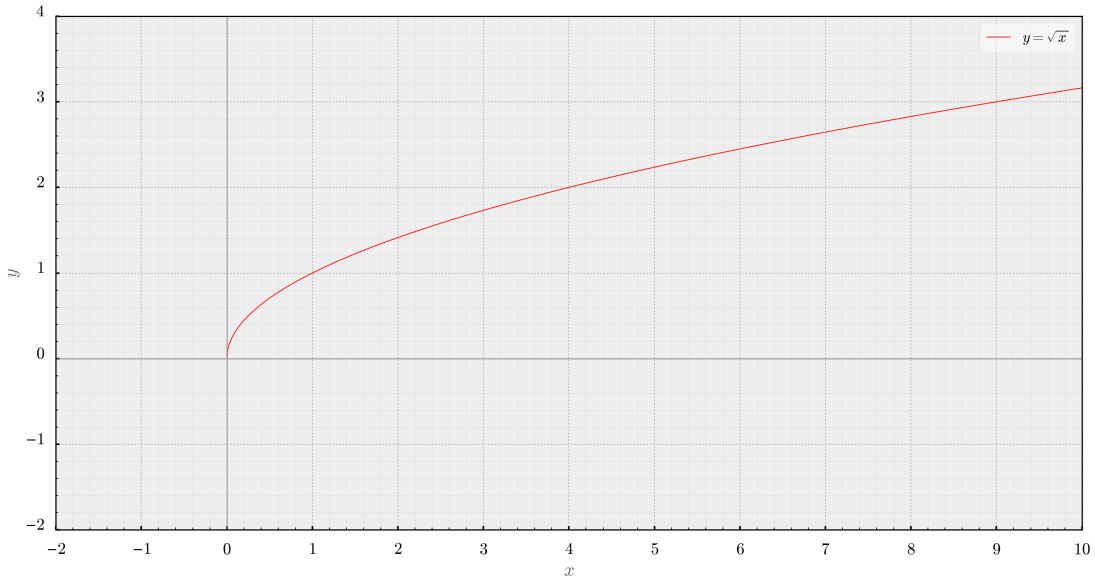

Figure 2: Square Root

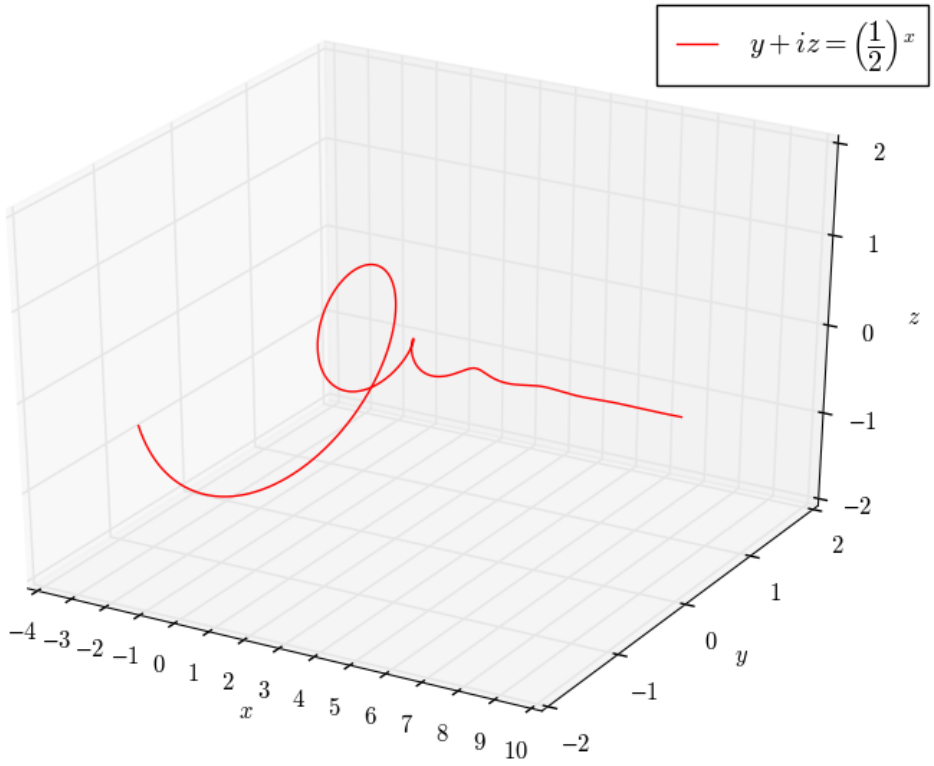

Figure 3: Spiral

```
def main():
    grapher = CustomPlot(dim = '3d', aspect_ratio = 1, xkcd = False)
    x1 = np.linspace(-1, 10, 100000)
    y1 = 0.5 ** x1 * np.cos(np.pi * x1)
    z1 = 0.5 ** x1 * np.sin(np.pi * x1)
    grapher.plot(x1, y1, z1, color = 'red', label = r'$y+iz=\left(\dfrac{1}{2}\right)
        ^x$')
    grapher.configure(axis_labels = ('$x$', '$y$', '$z$'), title = None)
    grapher.axis_fix(axis     = 'x',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -4,
                     last     = 10,
                     step     = 1)
    grapher.axis_fix(axis     = 'y',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -1,
                     last     = 2,
                     step     = 2)
    grapher.axis_fix(axis     = 'z',
                     symbolic = False,
                     s        = r'\pi',
                     v        = np.pi,
                     first    = -2,
                     last     = 2,
                     step     = 1)
    grapher.fig.tight_layout(pad = 2)
    plt.show()
```

Listing 3: Spiral

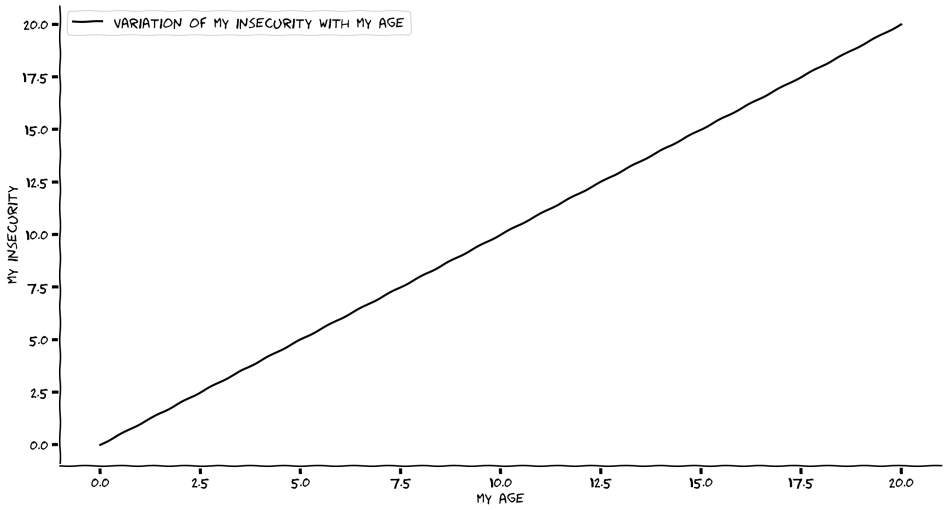

Figure 4: Spiral

```
    grapher = CustomPlot(dim = '2d', xkcd = True)
    x1 = np.linspace(0, 20, 100000)
    y1 = x1
    grapher.plot(x1, y1, color = 'black', label = r'variation of my insecurity with
       my age')
    grapher.configure(axis_labels = ('my age', 'my insecurity', '$z$'), title = None)
    grapher.fig.tight_layout(pad = 2)
    plt.show()
```

Listing 4: Insecurity