3D plotting with matplotlib

In this activity we will learn to plot three-dimensional datasets (or tabulated functions) with matplotlib. We will also use some of the tools that we developed during the term, such as loops, indexing, and reading and saving data from/to files.

Before we start, let's discuss the kind of data we will be dealing with. The file z.dat contains a 2d array of values of a quantity z that depends on two independent variables: x and y. The values of x at which the quantity z has been tabulated are containedin the file x.dat. The values of y at which the quantity z has been tabulated are contained in the file y.dat. The quantity z has been tabulated in a regular grid, for every location (x_i, y_j).

You will write a python script to carry out the following tasks:

1. Reads the values for the 1-dimensional arrays from the files x.dat and y.dat and for the 2-dimensional array from the file z.dat.
2. Plots the z array as a pseudocolor map, with labels, as shown in Figure 1
3. Adds a multicolored contour plot, as shown in Figure 2.
4. Finds local maxima of the quantity z. Plots the location of the maxima in the graph, as in Figure 3, and prints out the location (x, y) of the maxima and the local value of the quantity z. Something like:

   ```
   the quantity z has a local maximum at location (4.3,5.7) and its value is 1.066626586701
   ```

5. Writes the location (x, y) and value $z(x, y)$ of the local maxima in a three columns file
6. Challange 1 Adds a label to each contour level, as shown in Figure 4.
7. Challange 2 Makes a 3D projection of the quantity z as shown in Figure 5.