Intorduction

- In this project I analyzed the performance of multilayer perceptron.
  I used very simple structure that was inspired from 3blue1brown's video in youtube
  The structure of my neural network(NN) looks like this:
  input_layer - hidden_layer - output_layer
  2 : 250 : 1 (layers are shown respectively to the above structure)
- The hyperparameters are:
  - Learning rate: **0.1**
  - Learning rate scheduling scheme: **constant learning rate**
  - Number of hidden layer nodes: **250**
  - Epochs: **500**

First analysis

- In the first part of the analysis I developed a NN that was trained on
  the whole training set provided in Trn.csv and tested it
  using the test set provided in Tst.csv
- Results:
  - Train loss: `0.05`
  - Train accuracy: `97.94%`
  - Test loss: `0.09`
  - Test accuracy: `97.46%`
- You can also refer to the NN_all_accuracy.png to see
  how accuracy was chaning for the train and the test set as we pass epochs
- Similarly you can refer to the NN_all_loss.png to see
  how loss was dropping down after only about 10 epochs!
- By using the NN in this part, I obtained the graph for the Grid.csv
  Take a look at NN_all_grid.png
  We can observe how it draws the spiral figure

Second analysis

- In this part of the analysis I developed a NN that was trained on
  the first 40 entries of the training set Trn.csv and tested it
  using the test set provided in Tst.csv
- Results:
  - Train loss: `0.00`
  - Train accuracy: `100.00%`
  - Test loss: `1.09`
  - Test accuracy: `84.60%`
- As you can see the train accuracy and test accuracy differ significantly
  as compared to the first analysis. That is the case of data overfitting, it
  happens due to not giving our model enough data to train on, it learns how to solve
  "home" problems, but fails to provide good performance in "real" problems
- We can see how the NN_40_accuracy.png differs from the
  first analysis

- We can also see how NN_40_loss.png differs from the first analysis
- Drawing a grid from Grid.csv gives as inaccurate picture
  as shown in the NN_40_grid.png