**Exercise #2**

In Exercise 1, the single-layer feed-forward neural network was trained for 495 epochs, achieving a final training error of 0.04477200082565811. When tested with the input [0.1, 0.2], it produced an output of 0.408845.

While in Exercise 2, a two-layer feed-forward network was trained using a gradient descent backpropagation for 1000 epochs, with a final error of 0.09679992618680057. Testing the same input gave an output of 0.50169851.

The results show that the more complex network architecture in Exercise 2 were more effective in learning the underlying pattern in the data compared to the simpler single-layer network architecture in Exercise 1.

**Exercise #5**

This exercise asks for the code to implement a feed-forward neural network to recognize a sum pattern with 3 inputs. It goes through generating training data, training a neural network, testing then re-training with added data to give an analysis improvement in performance. With limited data the network may have issues recognizing a pattern in an accurate manner which may cause deviations in the predicted data, but increasing the size of the dataset it allows the network to perform better with improvement in accuracy of result 6 compared to result 5.