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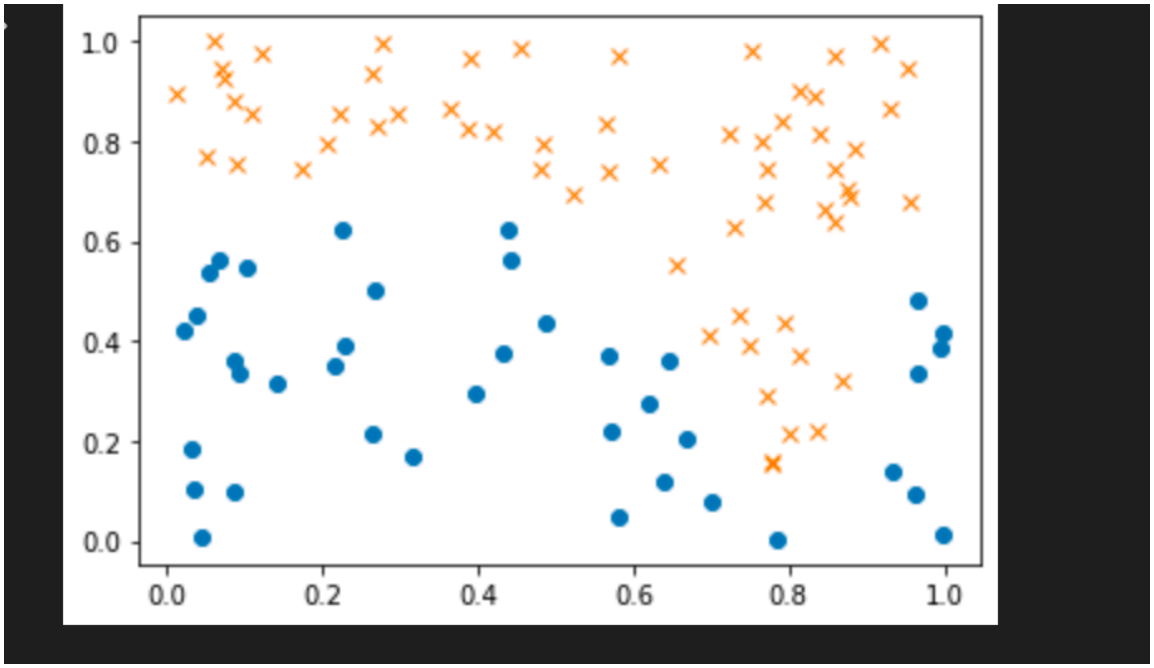
Q1
a)

```
✓ 0.2s

[0.872515911353291 0.8164760997195802 0.8733158426540304]
```

Question 2)



Q3

g)

```
print("Training error: ", cost)
```

✓ 0.3s

```
Training error:  -0.5141071271088112
```

h)

```
Confusion Matrix :
Predicted    0.0  1.0  All
True Labels
0             68    0   68
1             31    1   32
All           99    1  100
Accuracy Score : 0.69
```

```
print("Validation error: ", valid_cost)
```

4] ✓ 0.2s

```
Validation error:  -0.45201433337652724
```

I notice that the validation error is slightly less than the training error

i) -> change 1) Use 2 nodes in the hidden layer inserted of 3

```
Confusion Matrix :
Predicted    0.0  1.0  All
True Labels
0             65    0   65
1             16   19   35
All           81   19  100
Accuracy Score : 0.84
```

Here we can see that decreasing the amount of nodes in the hidden layer to 2 results in a higher accuracy on the validation data

-> change 2) use 5 nodes in the hidden layer

```
Confusion Matrix :
Predicted    0.0  1.0  All
True Labels
0             65    0   65
1             31    4   35
All           96    4  100
Accuracy Score : 0.69
```

Here we can see a slight decrease in accuracy from the original network and a significant decrease from the first tweak we tried.

-> change 3) add extra hidden layer with 3 nodes

```
Confusion Matrix :
Predicted    1.0  All
True Labels
0             65   65
1             35   35
All          100  100
Accuracy Score : 0.35
```

Here we see a dramatic lowering in accuracy

Therefore we can code the best model has 1 hidden layer with 2 nodes

j)

```
Confusion Matrix :
Predicted    0.0  1.0  All
True Labels
0             69    0   69
1             30    1   31
All           99    1  100
Accuracy Score : 0.7
```

Using the test data we generated we get an accuracy score of 70%

k) It is very important to have all three types of dataset, this is because we will be using the same training data over and over to train different models, we will then use our validation data to test any tweaks we have made. We then need a completely separate dataset that has never been seen before to test the final accuracy of our model.