Problem 2

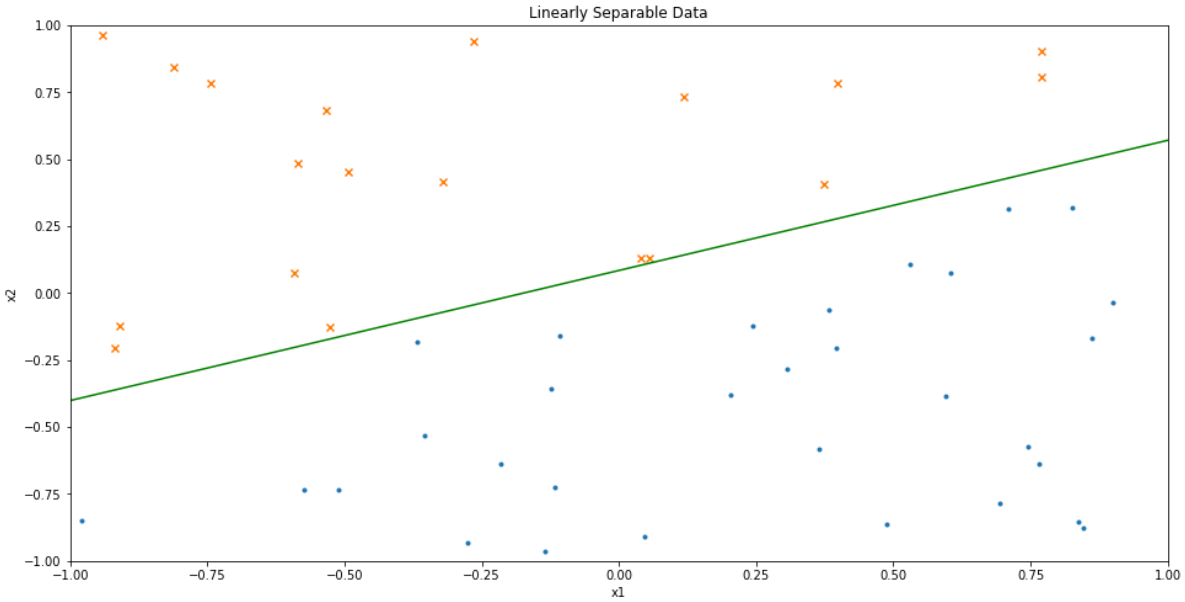
Method

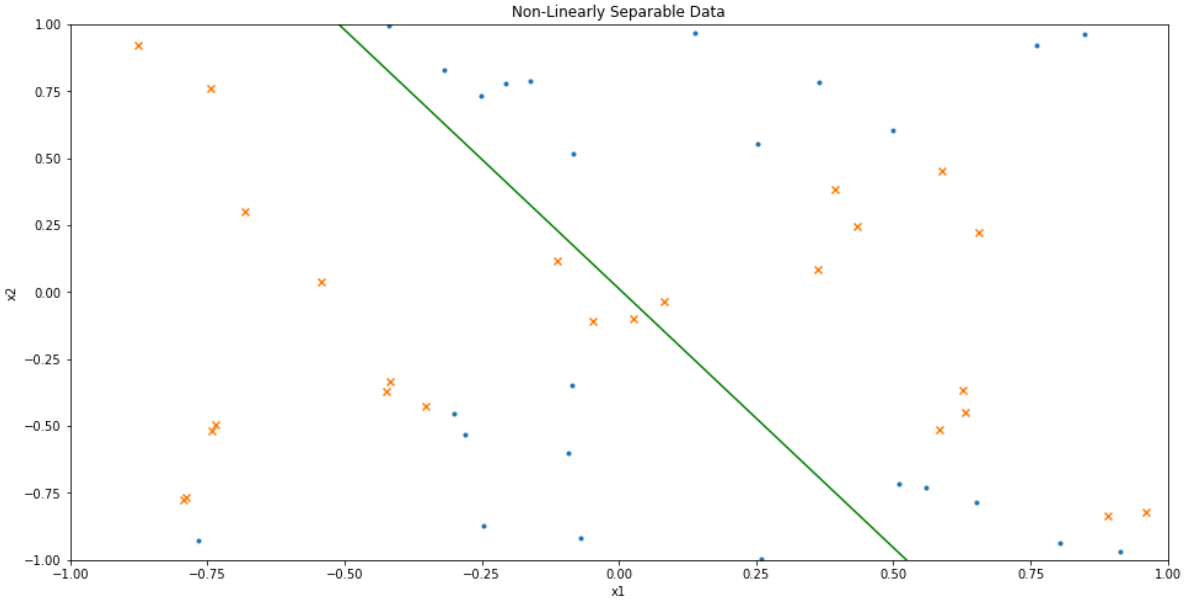
The same data was constructed as in Problem 1.

We now apply the LMS solution to fit the linear model. This was done by simply calculating the pseudo-invese on the dataset, and taking the product of the pseudoinvese with the labels to obtain the weight vectors. Decision boundaries, and classification errors for calculated for both datasets.

Out[1]: Toggle Code

```
Linearly Separable Data:
Weights: [ 0.1009821   0.57984581 -1.19375155], Error: 0.0
Non-linearly Separable Data:
Weights: [-0.00201506  0.31094307  0.16087904], Error: 0.38
```





Discussion

Like in problem 1, the LMS linear model cleanly separates the linearly-separable data with 0 error.

For the non-linearly separable data, the LMS linear model does not perfectly separate the data. However, it is noted that the error is less than the perceptron error for the non-linear data. At 0.38 error, classification can be done slightly better than random chance.