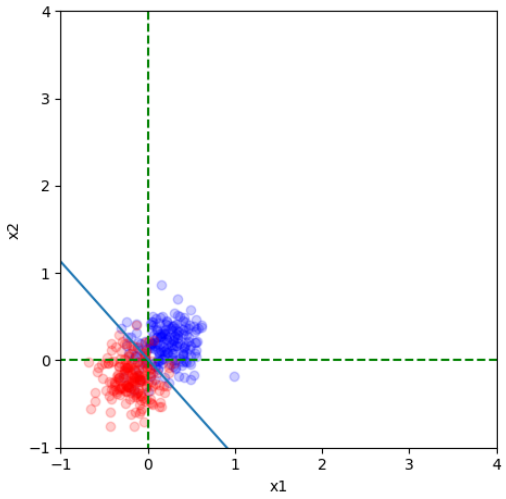
# [CMPUT 466/566] Machine learning

# Coding Assignment 2

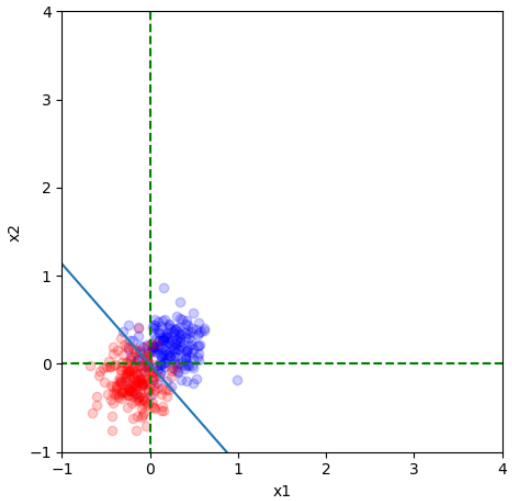
## Problem 1 [50%]

Accuracy of linear regression on dataset A: 0.92
Accuracy of linear regression on dataset A: 0.92
Accuracy of linear regression on dataset B: 0.75
Accuracy of linear regression on dataset B: 0.9375

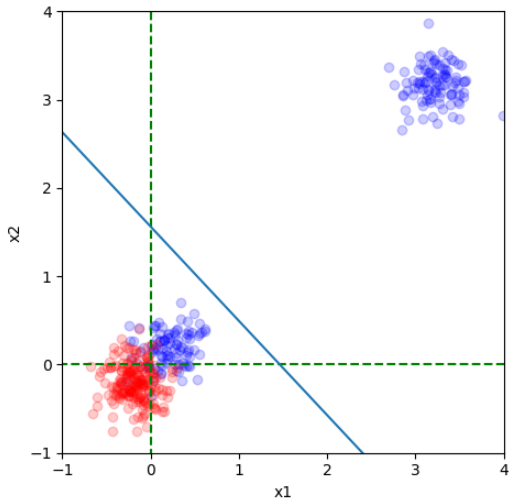
Decision boundary on Dataset A by linear regression:



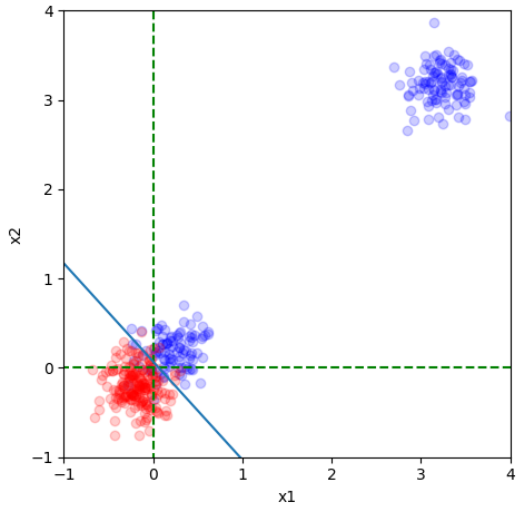

Decision boundary on Dataset A by logistic regression:



Decision boundary on Dataset B by linear regression:




Decision boundary on Dataset B by logistic regression:



## Problem 2 [50%]

1)

Hyperparameters are:

alpha = 0.1 # learning rate

batch_size = 100 # batch size

MaxEpoch = 50 # Maximum epoch

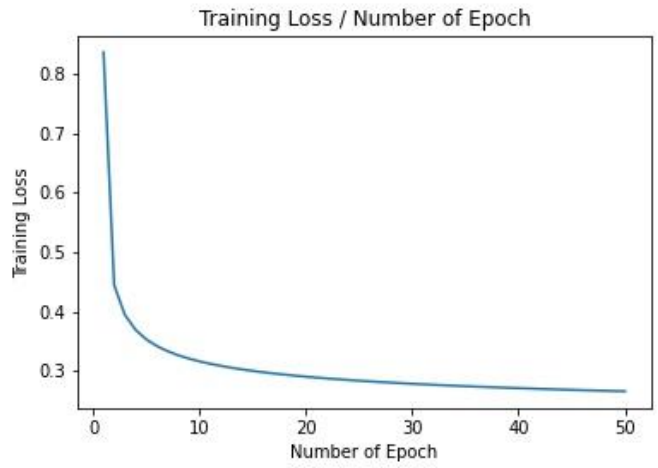
decay = 0. # weight decay

```
(50000, 785) (50000, 1) (10000, 785) (10000, 1) (10000, 785) (10000, 1)
At epoch 48 val:  0.9157 test: 0.9227
```

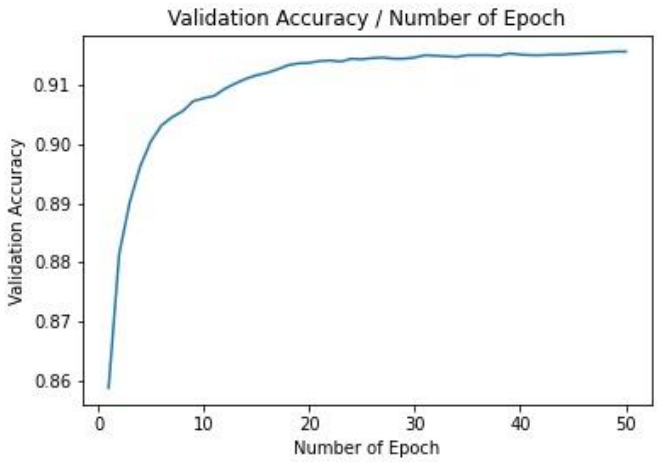
Epoch 48 yields the best validation performance.

In this epoch, the validation performance (accuracy) is: 0.9157, the test performance (accuracy) is: 0.9227.

The learning curve of the training cross-entropy loss




The learning curve of the validation accuracy



My Scientific question is:
What’s the effect of batch size on model training performance?

Other hyperparameters are fixed, change batch size from 100 to 200, rerun the model, and get: `At epoch 49 val:  0.9146 test: 0.9191`

Other hyperparameters are fixed, change batch size from 200 to 300, rerun the model, and get: `At epoch 49 val:  0.9124 test: 0.9172`

Therefore, we can almost get the conclusion: When batch size become bigger, validation performance (accuracy) and test performance (accuracy) will get smaller.