# Linear Classification Logistic Regression. In-class Exercise 2 Solution

EL-GY 6143 Intro Machine Learning. Prof. Sundeep Rangan

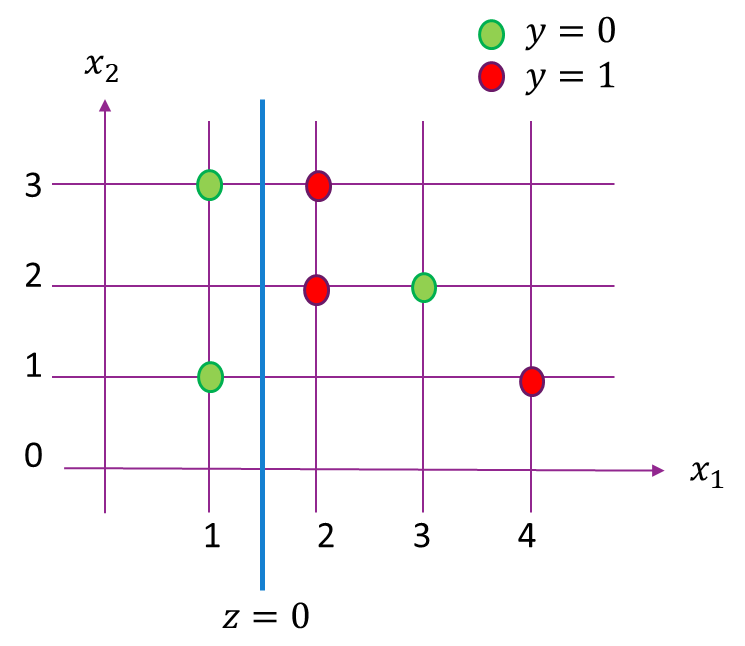
## Question

We are given the following six data points with binary labels .

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 1 | 1 | 1 | 0 |
| 2 | 1 | 3 | 0 |
| 3 | 2 | 2 | 1 |
| 4 | 2 | 3 | 1 |
| 5 | 3 | 2 | 0 |
| 6 | 4 | 1 | 1 |

1. Draw the points on a graph with different labels for each class
2. Is the data linearly separable?
3. Write a classifier for the data that makes a minimum number of errors. You must write a mathematical function describing the classifier output in terms of and . Do not just draw the boundary.
4. Write a short python function that performs the classification on a data matrix. It should output a vector of classification decisions, one for each sample.

## *Solution*

1. The points can be graphed as on the left
2. Data is not linearly separable
3. One possible classifier is:

The boundary ( is shown on the graph

1. One simple python code could be as follows. Note that you need to convert from Boolean to integer.

