# EXERCISE 2

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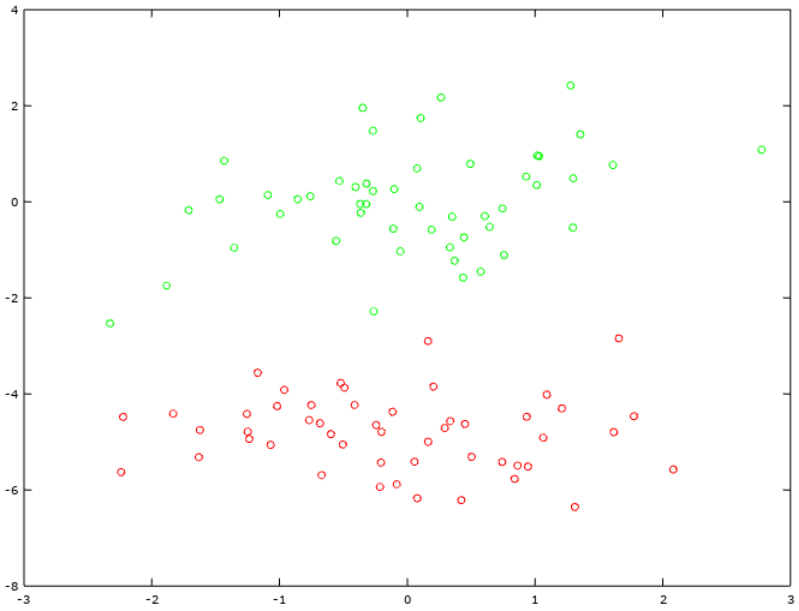
## 1. Binary Classification through Logistic Regression




(1) Download the data file "data.mat" (or "data.txt" if you are not using matlab) which contains a matrix of size $100 \times 3$. The first 50 rows are positive examples (label 1) of points in 2 dimensions. The last 50 rows are negative examples (label 0) also in 2 dimensions.
The first 5 rows of the file contains the following values (with precision 2):
1.3 -0.54 1
-2.3 -2.5 1
-0.37 -0.047 1
0.49 0.79 1
1 0.95 1
where the first two columns correspond to points in 2 dimensions, and the last column is the corresponding label.
(2) Implement in your favorite programming language the Logistic Regression algorithm, so that you classify correctly both types of data.
(3) Initialize the parameters of your model with random values in the interval $(-0.01, 0.01)$.

(4) Plot the data points using one color for each class of data. Also, plot the classifier line that you found using logistic regression.
(5) Prepare a report containing your final model (including parameters), your final $\alpha$ value, and your graph.

## 2. Deadline

- May 11th, 2020.

## 3. Hints

- Use a linear model of the form $z = \theta_0 + \theta_1 x_1 + \theta_2 x_2$. Don't use a polynomial!
- This model should be evaluated in the sigmoid function $g(\mathbf{x}) = \frac{1}{1+e^{-z}}$.
- Once your algorithm has estimated the correct vector of parameters $\theta$, you can plot such model (the black line) using the function $x_2 = (\theta_0 + \theta_1 x_1)(-1/\theta_2)$.
- The solution should look like the following plot, where the blue line is the initial model (with random parameters) and the black line is the final answer, after 100 iterations.