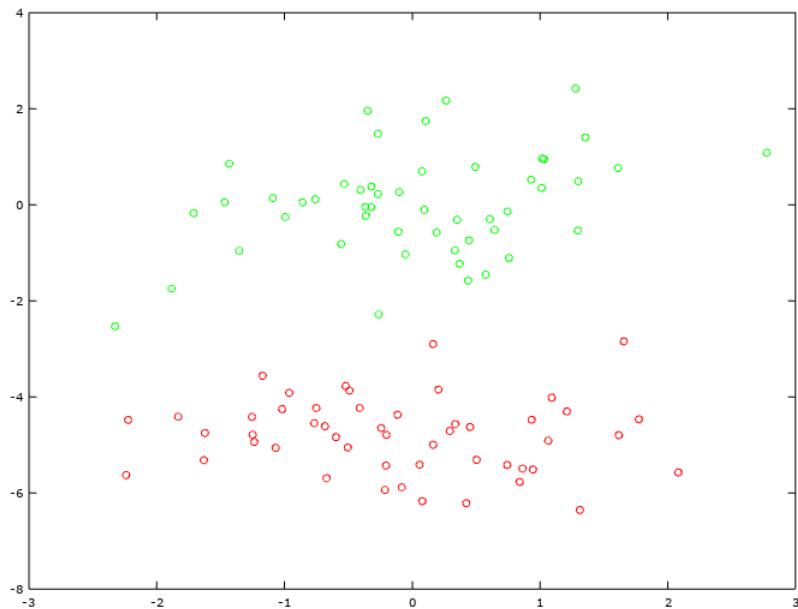


EXERCISE 2

DR. VICTOR UC CETINA

1. BINARY CLASSIFICATION THROUGH LOGISTIC REGRESSION



- (1) Download the data file “data.txt” which contains a matrix of size 100×3 . 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 a Google Colab notebook 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 α value, and your graph.

2. DEADLINE

- Feb 13th, 2026.

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 θ , 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.

