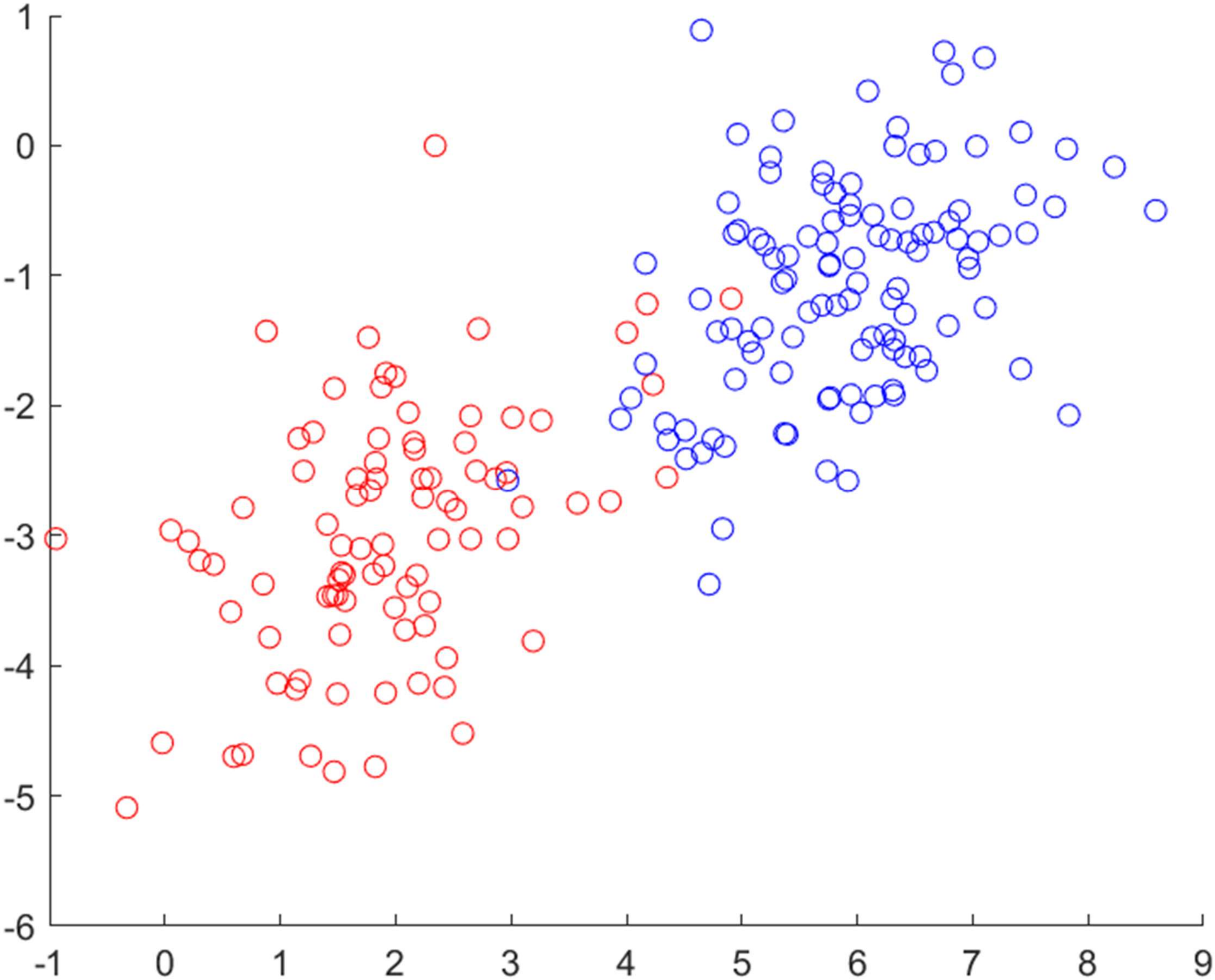
Omar Ahmad   EEM146 HW 6 #5

a.



The data is not linearly separable

b. P(y=0) = 89/200 = 0.445

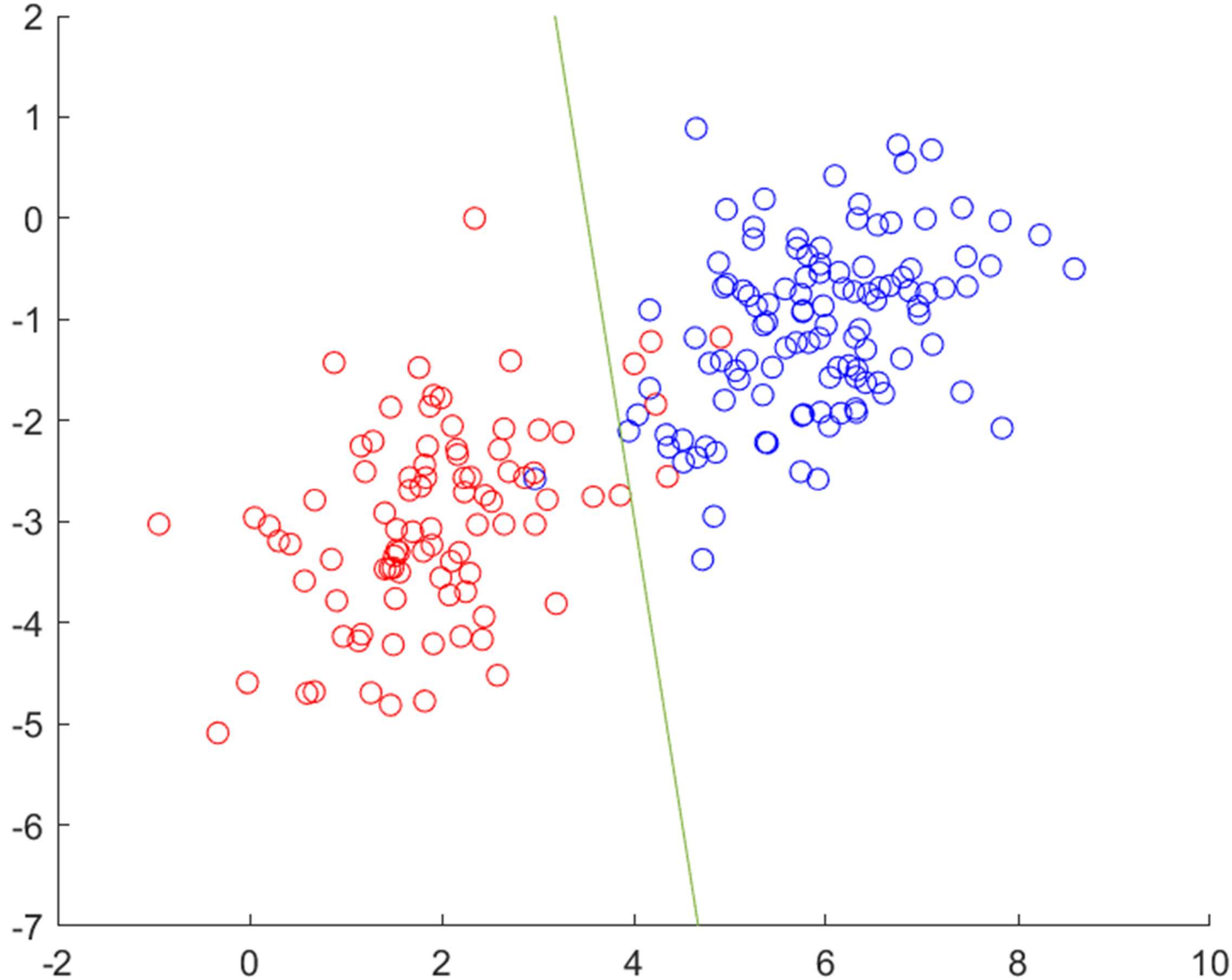
μ_0 = [1.9195, -2.9972]

μ_1 = [5.8982, -1.0793]

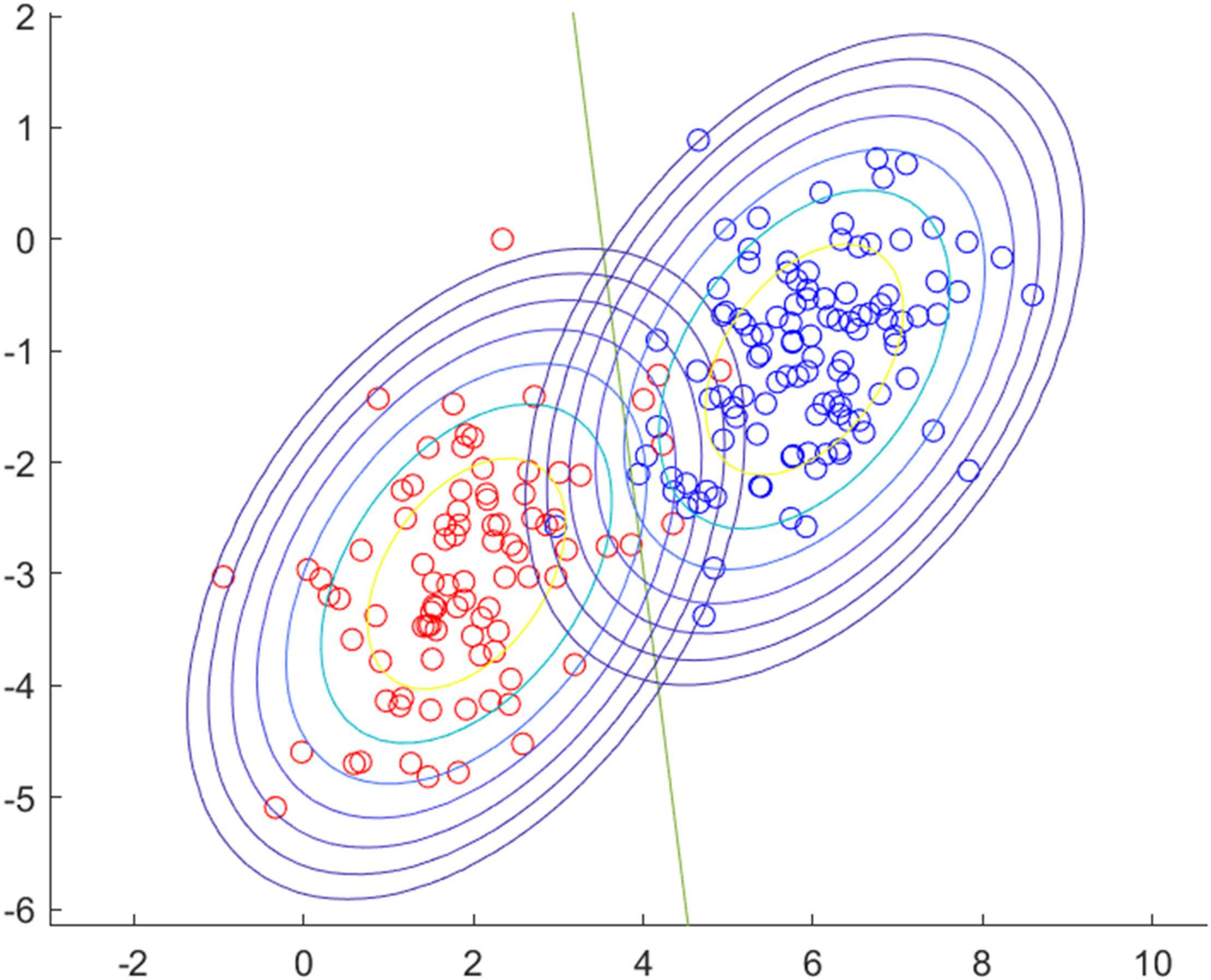
$\Sigma = \begin{bmatrix} 1.0181 & 0.3887 \\ 0.3887 & 0.8036 \end{bmatrix}$

```
close;
clear;
clc;
load data.csv;
%hold on;
num0 = 0;
num1 = 0;
mu0  = 0;
mu1  = 0;

for i = 1:length(data)
    if data(i,3) == 0
        num0 = num0 + 1;
        mu0 = mu0 + data(i,1:2);
    else
        num1 = num1 + 1;
        mu1 = mu1 + data(i,1:2);
    end
end

Py0 = num0 / length(data);
mu0 = mu0  / num0;
mu1 = mu1  / num1;

Sigma = 0;
for i = 1:length(data)
    if data(i,3) == 0
        Sigma = Sigma + (data(i,1:2)-mu0).*(data(i,1:2)-mu0)';
    else
        Sigma = Sigma + (data(i,1:2)-mu1).*(data(i,1:2)-mu1)';
    end
end
Sigma = Sigma / length(data);
```

c. W = [-3.6755, -0.609] & b = 12.905



d.



The decision boundary does pass through the points where the two distributions have equal probabilities because that is the definition of the decision boundary: the place at which each option has equal probability. The rings in the above figure denote regions of equal probability. The decision boundary passes through points where each class's rings intersect.