Machine Learning

Assignment 3

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Problem 1

A.

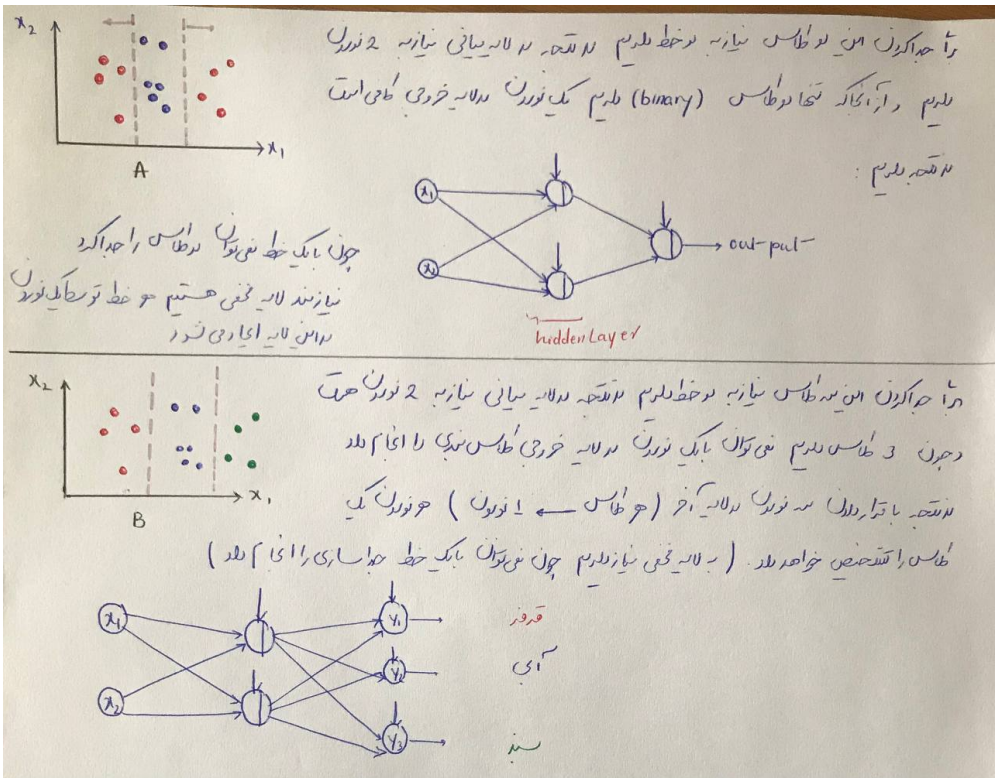


Figure 1

B.

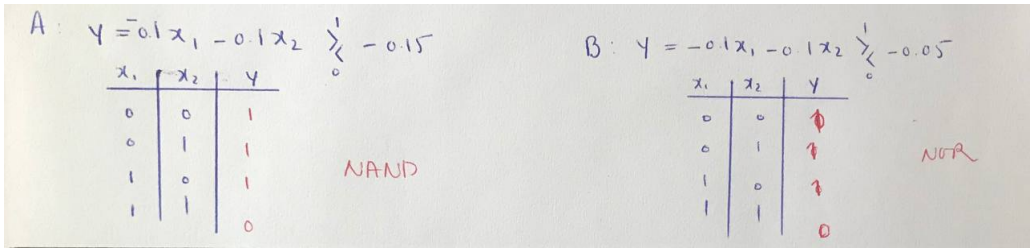


Figure 2

C.

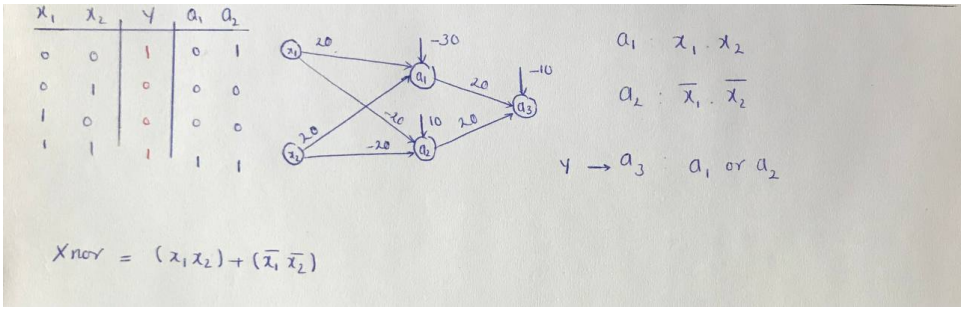

x1 x2 y a1 a2
0 0 1 0 1
0 1 0 0 0
1 0 0 0 0
1 1 1 1 1
20
-30
-10
20
-20
10
20
-20
a1 : x1 . x2
a2 : x̄1 . x̄2
y → a3 a1 or a2
Xnor = (x1 x2) + (x̄1 x̄2)

Figure 3

Problem 2

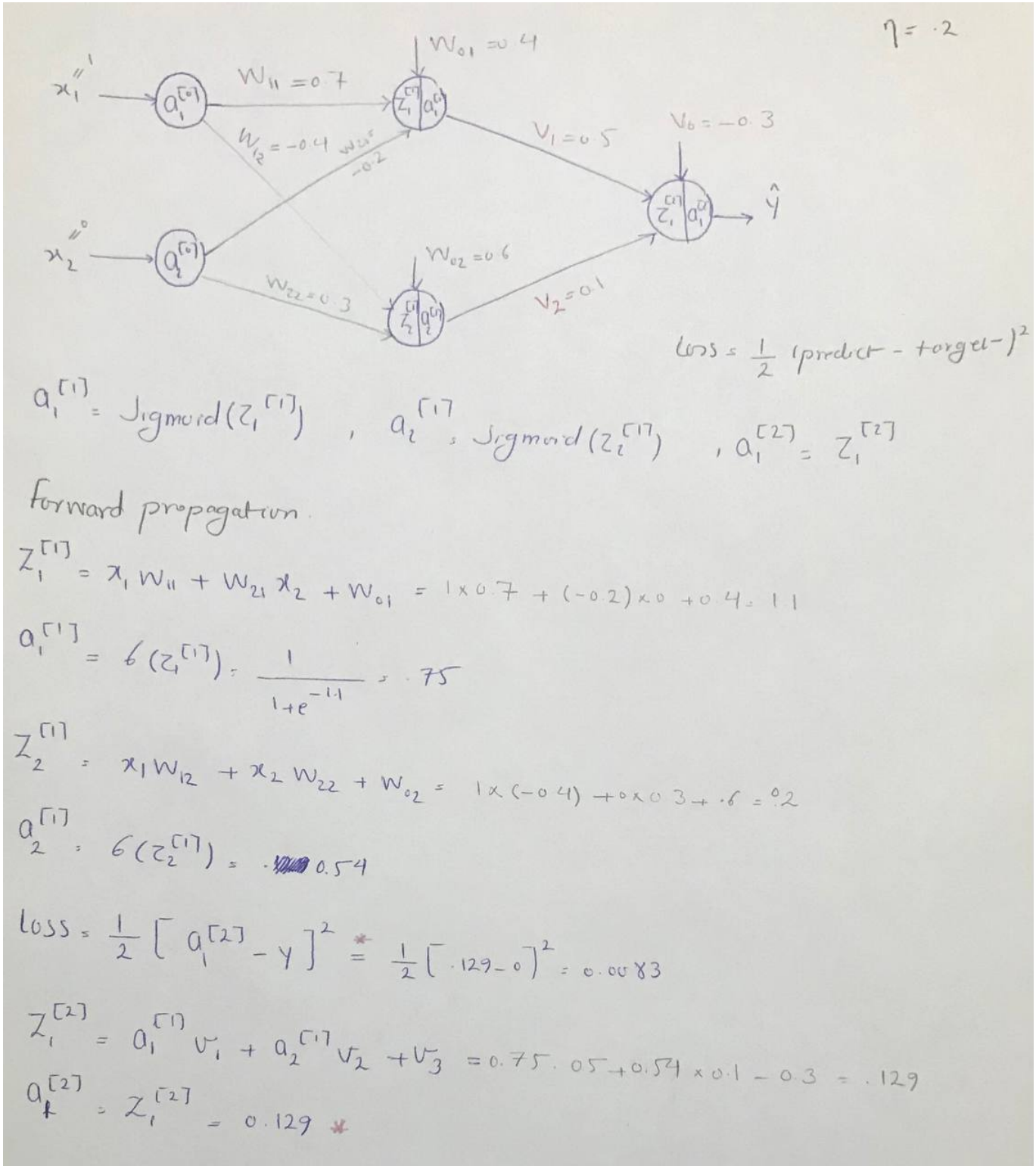
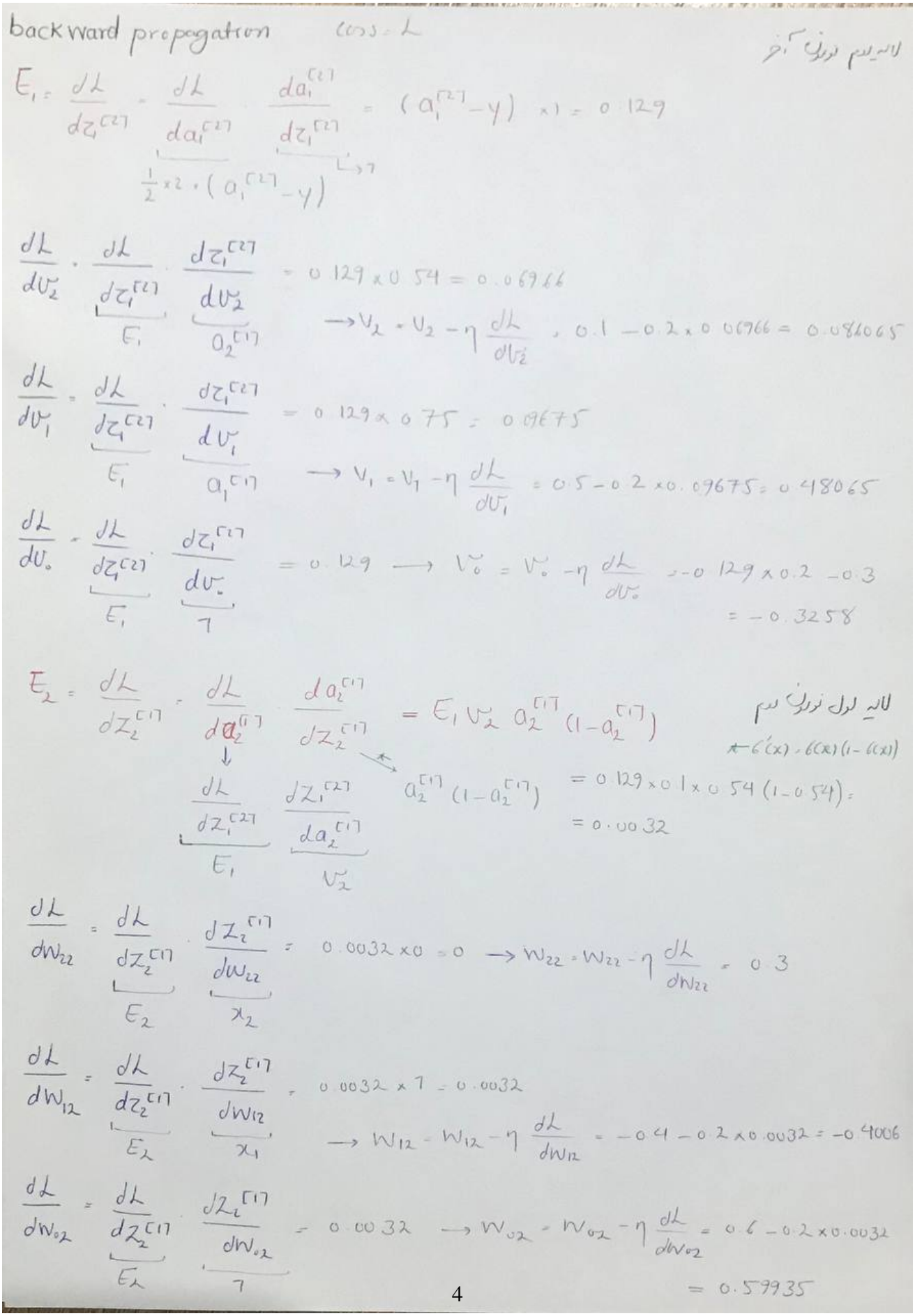


Figure 4



4

Figure 5

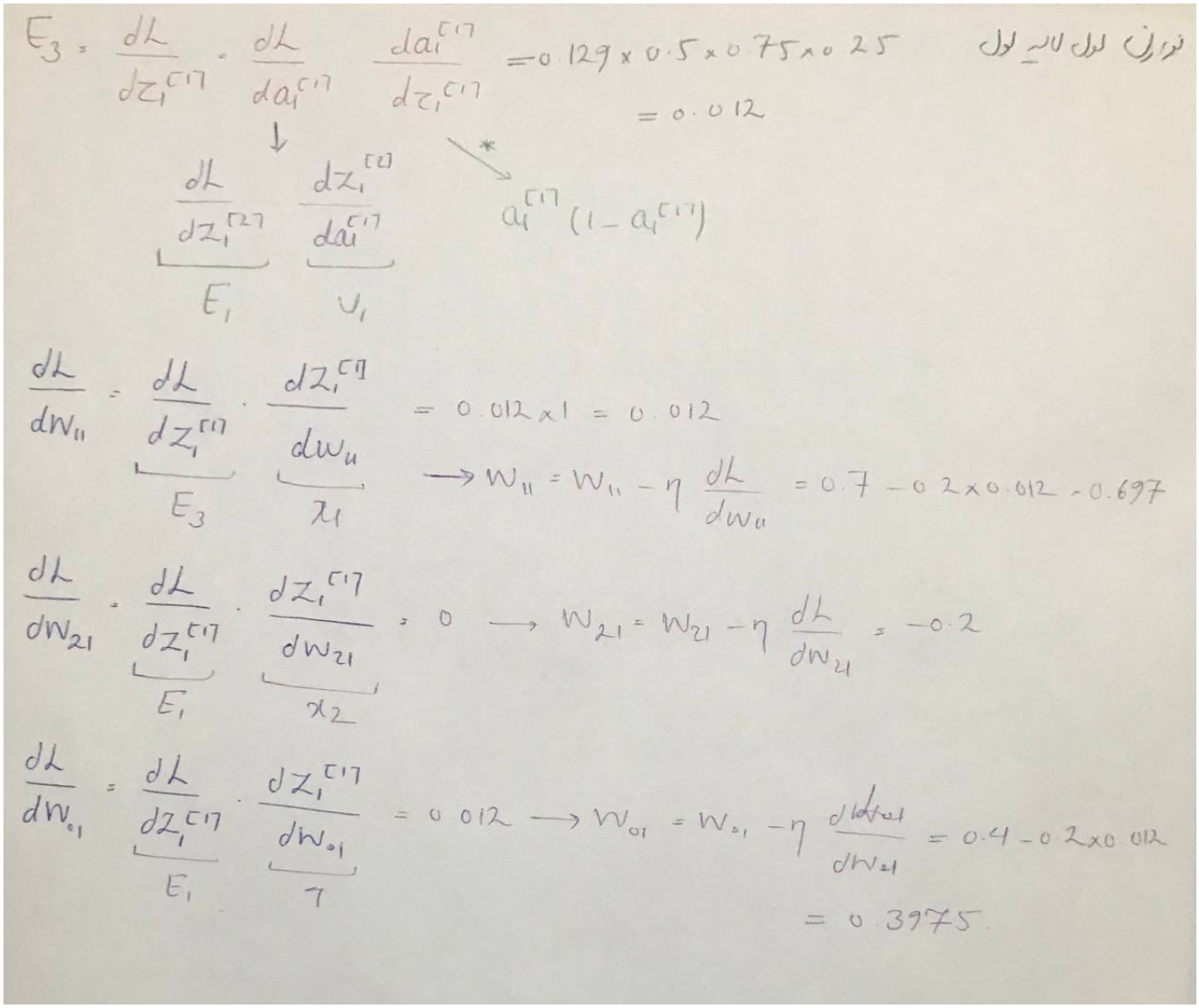

وزن لول لایہ لول
$E_3 = \frac{dL}{dz_1^{[1]}} \cdot \frac{dL}{da_1^{[1]}} \cdot \frac{da_1^{[1]}}{dz_1^{[1]}} = 0.129 \times 0.5 \times 0.75 \times 0.25$
$= 0.012$
$\frac{dL}{dz_1^{[2]}}$ $\frac{dz_1^{[2]}}{da_1^{[1]}}$
E_1 V_1
$a_1^{[1]}(1 - a_1^{[1]})$
$\frac{dL}{dw_{11}} = \frac{dL}{dz_1^{[1]}} \cdot \frac{dz_1^{[1]}}{dw_{11}} = 0.012 \times 1 = 0.012$
E_3 x_1
$\rightarrow w_{11} = w_{11} - \eta \frac{dL}{dw_{11}} = 0.7 - 0.2 \times 0.012 = 0.697$
$\frac{dL}{dw_{21}} = \frac{dL}{dz_1^{[1]}} \cdot \frac{dz_1^{[1]}}{dw_{21}} = 0 \rightarrow w_{21} = w_{21} - \eta \frac{dL}{dw_{21}} = -0.2$
E_1 x_2
$\frac{dL}{dw_{01}} = \frac{dL}{dz_1^{[1]}} \cdot \frac{dz_1^{[1]}}{dw_{01}} = 0.012 \rightarrow w_{01} = w_{01} - \eta \frac{dL}{dw_{01}} = 0.4 - 0.2 \times 0.012$
E_1 1
$= 0.3975$

Figure 6

Problem 3

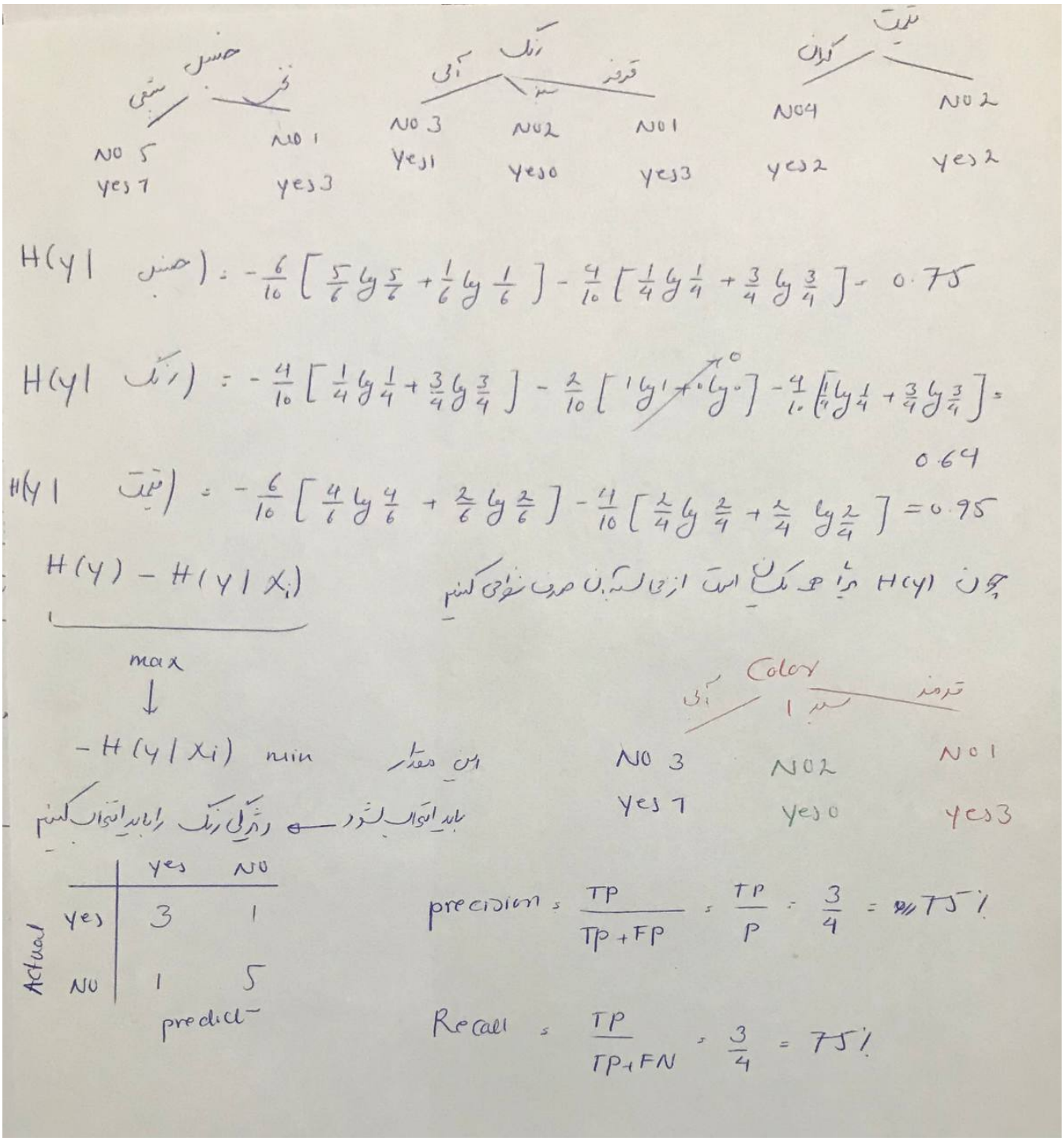


Figure 7

Problem 4

A.

B.

Problem 5:

A.

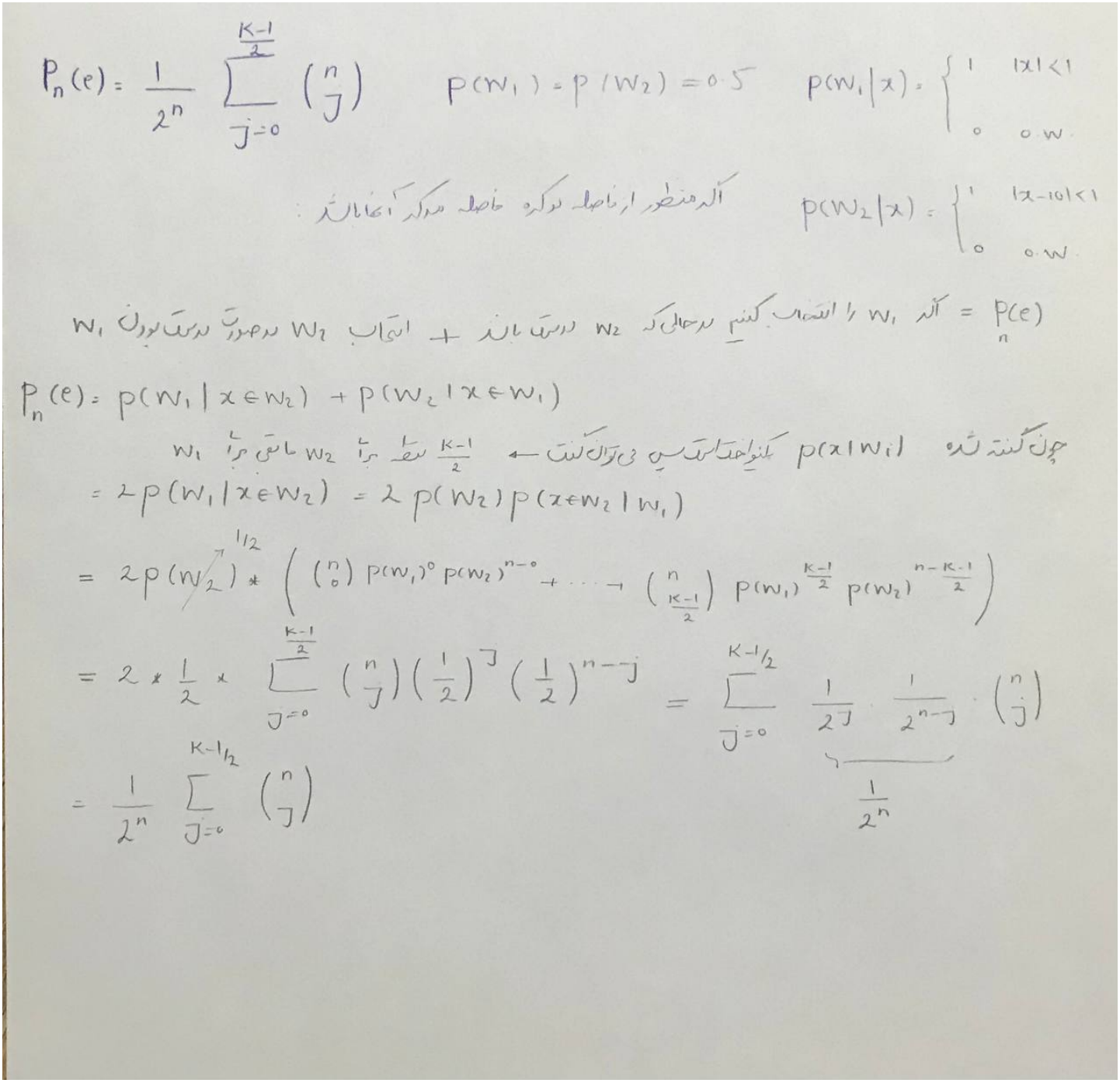


Figure 8

B.

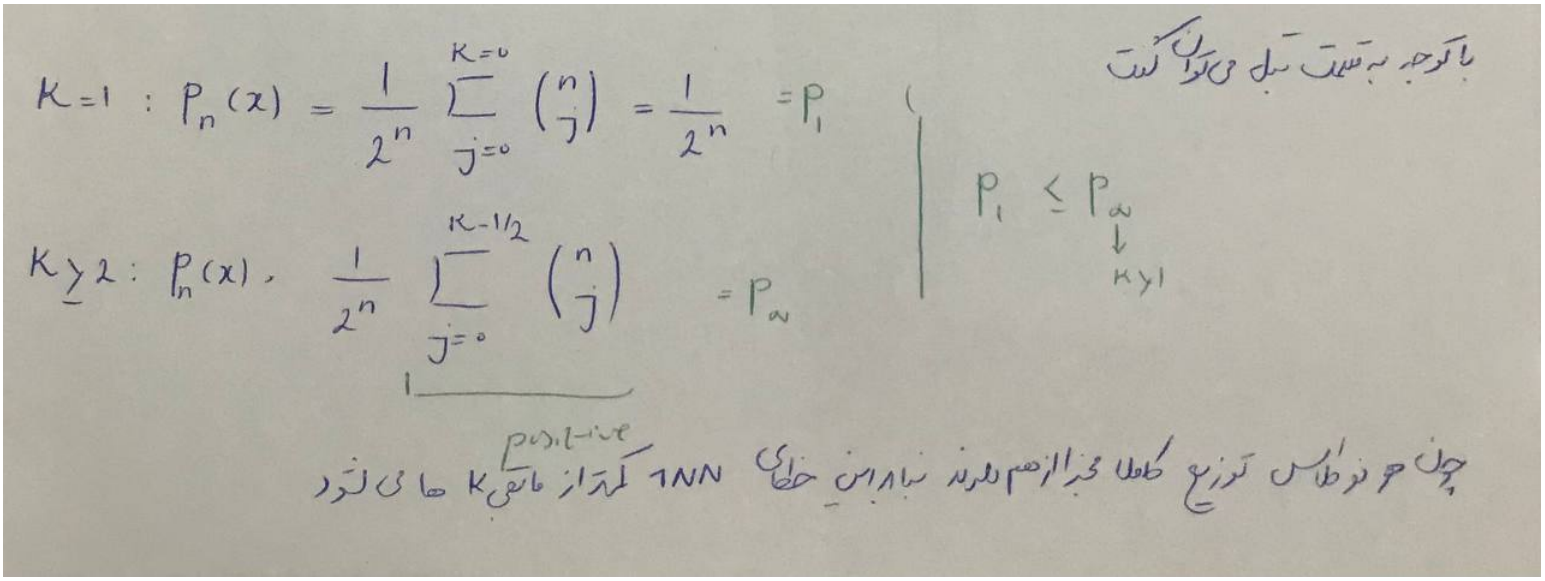


Figure 9

C.

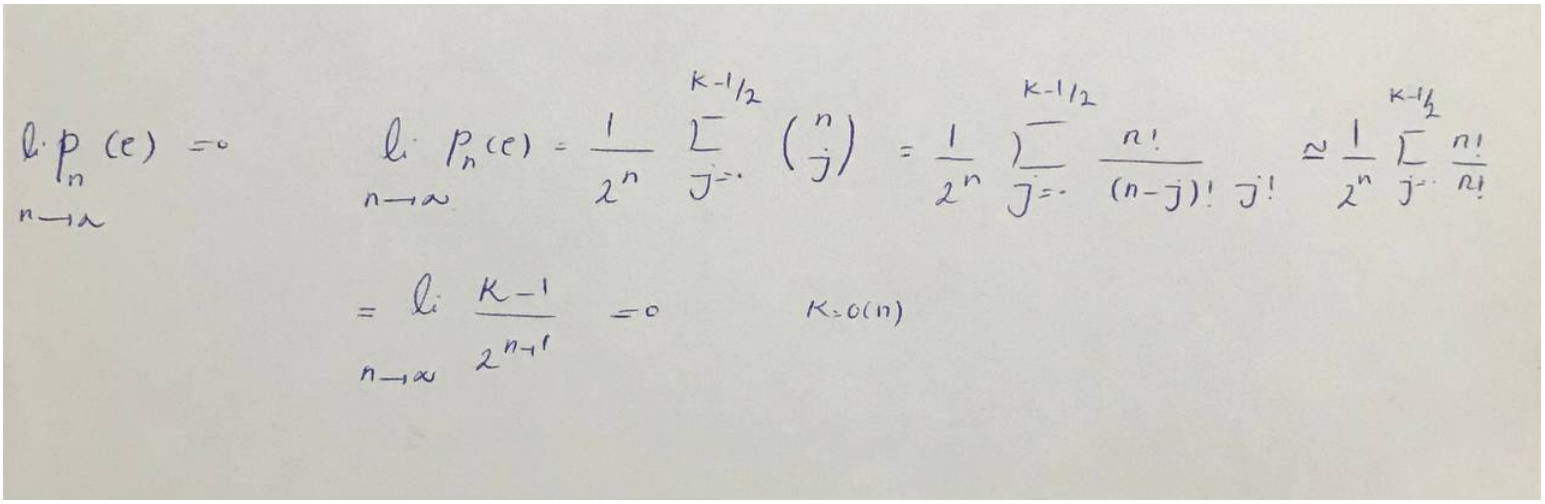


Figure 10

Problem 6

Please see this file: ”Q6.ipynb”
Code and explanation are provided.

Problem 7

Please see this file: ”Q7.ipynb”
Code and explanation are provided.

Problem 8

Please see this file: ”Q8.ipynb”
Code and explanation are provided.