T.C.

MARMARA UNIVERSITY

FACULTY of ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CSE4088

Introduction to Machine Learning

Homework #2

150116034 – Enes Garip

CSE4088 Introduction To Machine Learning Homework-2

Eren Garip
150116034

1) $0.03 \geq 2 \cdot 1 \cdot e^{-2 \cdot \underbrace{(0.05)^2}_{0.0025} \cdot N}$

$0.03 \geq 2 \cdot 1 \cdot e^{-0.005 \cdot N}$

$0.015 \geq e^{-0.005 \cdot N}$

$\ln(0.015) \geq \ln(e^{-0.005N})$

$\ln(0.015) \geq -0.005N$

$-4.199 \geq -0.005N$

$-839.941 \geq -N$

$839.941 \leq N \Rightarrow N$ should be 1000

B) 1000

2) $0.03 \geq 2.10 \cdot e^{-2(0.05)^2 \cdot N}$

$0.0015 \geq e^{-0.005N}$

$\ln(0.0015) \geq -0.005N$

$-1300.4580 \geq -N$

$1300.4580 \leq N \Rightarrow N$ should be 1500

C) 1500

3) $0.03 \geq 2.100 \cdot e^{-2(0.05)^2 \cdot N}$

$0.00015 \geq e^{-0.005N}$

$\ln(0.00015) \geq -0.005 \cdot N$

$-1760.9950 \geq -N$

$1760.9950 \leq N \Rightarrow N$ should be 2000

D) 2000

```
----- Q.4, Q.5, Q.6, Q.7 Experiment with N = 10 -----
Convergence Ratio: 19.0
Disagreement Ratio: 0.15000000000000283
Total Iteration: 2000
-------------------------------------------------------

----- Q.4, Q.5, Q.6, Q.7 Experiment with N = 100 -----
Convergence Ratio: 1099.0
Disagreement Ratio: 0.03545454545454447
Total Iteration: 11000
-------------------------------------------------------
-----------------------------------------
Q.8:  0.038890000000000105
-----------------------------------------
-----------------------------------------
Q.9:  0.039410000000000084
-----------------------------------------
-----------------------------------------
Q.11: 0.5196700000000005
-----------------------------------------
-----------------------------------------
Q.12-a: 0.3620000000000041
Q.12-b: 0.18100000000000205
Q.12-c: 0.18899999999999537
Q.12-d: 0.00699999999999988
Q.12-e: 0.06600000000000111
-----------------------------------------

Process finished with exit code 0
```

For Question 4, 5, 6, 7 I create a function to calculate the convergence ratio and disagreement ratio. First of all, I imported numpy library to create a dataset. After the creation, defined a function to calculate the equation of a line. After that, an infinite loop iterates the datasets and calculates dot product. At the end, I calculated the convergence ratio and disagreement ratio.

According to my results after several times of running the program:

4) B

5) C

6) D

7) B

8) C

9) C

10) –

11) D

12) A

13) –