

## Question 1

-----

\*\*\* Using only 5,000 MNIST training points \*\*\*

### Question 1(a)

-----

### Question 1(b)

-----

### Question 1(c)

-----

### Question 1(d)

-----

### Question 1(f)

-----

The RMS is 2.4882716775744692e-14

## Question 2

-----

Question 2(a)

-----

This is accuracy of small training set 1.0000

This is accuracy of full test set 0.1434

Question 2(b)

-----

The small training accuracy for 1 is 0.055

The small training accuracy for 0.5 is 0.13

The small training accuracy for 0.25 is 0.14

The small training accuracy for 0.125 is 0.14

The small training accuracy for 0.0625 is 0.15

The small training accuracy for 0.03125 is 0.175

The small training accuracy for 0.015625 is 0.185

The small training accuracy for 0.0078125 is 0.22

The small training accuracy for 0.00390625 is 0.27

The small training accuracy for 0.001953125 is 0.34

The small training accuracy for 0.0009765625 is 0.375

The small training accuracy for 0.00048828125 is 0.5

The small training accuracy for 0.000244140625 is 0.6

The small training accuracy for 0.0001220703125 is 0.71

The small training accuracy for 6.103515625e-05 is 0.78

The small training accuracy for 3.0517578125e-05 is 0.83

The small training accuracy for 1.52587890625e-05 is 0.895

The small training accuracy for 7.62939453125e-06 is 0.91

The small training accuracy for 3.814697265625e-06 is 0.93

The small training accuracy for 1.9073486328125e-06 is 0.955

The maximum validation accuracy is 0.2432

Question 2(d)

-----

The maximum validation accuracy is 0.6938

The corresponding K is 8

The corresponding training accuracy is 0.9300

Question 2(f)

-----

The maximum validation accuracy is 0.8442

Question 3

-----

Question 3(a)

-----

Question 3(b)

-----

The base classifier accuracy is 0.2430

The accuracy of validation with bagging is 0.6087

Question 3(c)

-----

Question 3(d)

-----

Question 3(e)

-----

Question 3(f)

-----

The base accuracy is 0.3994

The bagged classifier accuracy is 0.8453

Question 3(g)

-----

Question 3(h)

-----

The maximum bagged accuracy is 0.862

Question 4

-----

Question 4(a)

-----

Question 4(b)

-----

The accuracy of training set is -3536.4314948532992

The accuracy of test set is -3732.802049793892

Question 4(c)

-----

The accuracy of training set is -3.694550305890344

The accuracy of test set is -3.760869741773881

Question 4(d)

-----

The accuracy of training set is -3.594361136392263

The accuracy of test set is -3.7297833667329154

The difference of accuracy is 0.031086375040965564

Question 4(e)

-----

I don't know

Question 4(f)

-----

I don't know