CSC311
Assignment 01 (printed output)
Ye Huang

Question 1

Question 1(a):
[[0.5507979 0.70814782 0.29090474 0.51082761 0.89294695]
 [0.89629309 0.12558531 0.20724288 0.0514672 0.44080984]
 [0.02987621 0.45683322 0.64914405 0.27848728 0.6762549]
 [0.59086282 0.02398188 0.55885409 0.25925245 0.4151012]]

Question 1(b):
[[0.28352508]
 [0.69313792]
 [0.44045372]
 [0.15686774]]

Question 1(c):
[[0.5507979 0.70814782 0.29090474 0.51082761 0.89294695 0.89629309
  0.12558531 0.20724288 0.0514672 0.44080984]
 [0.02987621 0.45683322 0.64914405 0.27848728 0.6762549 0.59086282
  0.02398188 0.55885409 0.25925245 0.4151012]]

Question 1(d):
[[0.26727282 0.42462274 0.00737966 0.22730252 0.60942187]
 [0.20315517 -0.56755261 -0.48589504 -0.64167072 -0.25232807]
 [-0.41057751 0.01637951 0.20869033 -0.16196644 0.23580118]
 [0.43399508 -0.13288586 0.40198635 0.10238471 0.25823346]]

Question 1(e):
[0.28352508 0.69313792 0.44045372 0.15686774]

Question 1(f):
[[0.5507979 0.70814782 0.29090474 0.28352508 0.89294695]
 [0.89629309 0.12558531 0.20724288 0.69313792 0.44080984]
 [0.02987621 0.45683322 0.64914405 0.44045372 0.6762549]
 [0.59086282 0.02398188 0.55885409 0.15686774 0.4151012]]

Question 1(g):
[[0.57442982 0.42462274 0.00737966 0.22730252 0.60942187]
 [0.9003808 -0.56755261 -0.48589504 -0.64167072 -0.25232807]
 [1.08959777 0.01637951 0.20869033 -0.16196644 0.23580118]

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 [ 0.71572183 -0.13288586  0.40198635  0.10238471  0.25823346]]

Question 1(h):
[[0.5507979  0.70814782 0.29090474 0.28352508 0.89294695]
 [0.89629309 0.12558531 0.20724288 0.69313792 0.44080984]
 [0.02987621 0.45683322 0.64914405 0.44045372 0.6762549 ]]

Question 1(i):
[[0.70814782 0.28352508]
 [0.12558531 0.69313792]
 [0.45683322 0.44045372]
 [0.02398188 0.15686774]]

Question 1(j):
[[-0.59638732 -0.34510242 -1.23475942 -1.26045469 -0.1132281 ]
 [-0.10948781 -2.07476999 -1.57386385 -0.36652628 -0.81914169]
 [-3.51069274 -0.78343689 -0.43210063 -0.81994991 -0.3911852 ]
 [-0.52617141 -3.73045663 -0.58186686 -1.85235226 -0.87923294]]

Question 1(k):
9.087621365532033

Question 1(l):
[0.89629309 0.70814782 0.64914405 0.69313792 0.89294695]

Question 1(m):
2.7263225002245983

Question 1(n):
[[ 1.57884629 -0.35284012 -0.187686   -0.3942709   0.26913377]
 [ 1.03478465  0.23371525  0.04918167  0.0088431   0.51378681]
 [ 1.46099184 -0.05772761  0.26157029 -0.11477974  0.42237427]
 [ 1.37914438 -0.28663212 -0.17972284 -0.4355982   0.14225624]
 [ 1.94377489  0.08489845  0.1003952  -0.14691625  0.69960743]]

Question 1(j):
[[2.22648013]]
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Question 2

Question 2(c):
N = 100:
Magnitude of B1-B2: 2.9334653537595045e-12
Execution time for naive iterative method with N = 100 is
1.135850429534912
Execution time for vectorized method with N = 100 is 0.0009951591491699219
N = 300:
Magnitude of B1-B2: 2.0654458105360083e-10
Execution time for naive iterative method with N = 300 is
30.399251699447632
Execution time for vectorized method with N = 300 is 0.005206584930419922
N = 1000:
Magnitude of B1-B2: 6.559265754397899e-09
Execution time for naive iterative method with N = 1000 is
1160.683301448822
Execution time for vectorized method with N = 1000 is 0.1378917694091797

Question 3
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a: 3.129414619191207
b: 4.719354385844762
Mean Square Error of training data: 0.8557483910540564
Mean Square Error of test data: 0.9608049758277348

Question 4

Question 4(a):
Weight: [0.01694442 1.49601981 0.03738886]
Bias: -2.6250489555396475

Question 4(b):
accuracy1: 0.856
accuracy2: 0.856
accuracy1 - accuracy2: 0.0

Question 5

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Question 5(e):
Q4 outputs:
Weight: [0.01694442 1.49601981 0.03738886]
Bias: -2.6250489555396475
Q5 outputs:
Bias: -2.6381660016118893
final weight vector = [0.01740979 1.50266708 0.03800213]
learning rate: 1
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Question 6

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Question 6(c):
best k value: 3
best k validation accuracy: 0.9905013192612138
best k test accuracy0.9929729729729729

Question 6(d):
best k value: 9
best k validation accuracy: 0.9975996159385502
best k test accuracy0.9965174129353234
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End of Assignment