CSC311 A1 Printed Outputs

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Question 1(a)

```
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)

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

Question 1(c)

```
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)

```
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)

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

Question 1(f)

```
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)

```
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]
 [ 0.71572183 -0.13288586  0.40198635  0.10238471  0.25823346]]
```

Question 1(h)

```
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)

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

Question 1(j)

```
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)

```
Question 1(k):
9.087621365532033
```

Question 1(l)

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

Question 1(m)

```
Question 1(m):
2.7263225002245983
```

Question 1(n)

```
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(o)

```
Question 1(o):
[[2.22648013]]
```

Question 2(d)

```
B1 execution time at N = 100 is 3.476166248321533 seconds
B2 execution time at N = 100 is 0.0 seconds
Magnitude of the difference matrix: 1.2960299500264227e-10
The number of floating-point multiplications is: 2000000

B1 execution time at N = 300 is 87.40567874908447 seconds
B2 execution time at N = 300 is 0.002994060516357422 seconds
Magnitude of the difference matrix: 4.3474028643686324e-07
The number of floating-point multiplications is: 54000000

B1 execution time at N = 1000 is 3312.316363096237 seconds
B2 execution time at N = 1000 is 0.06604790687561035 seconds
Magnitude of the difference matrix: 8.139530837070197e-05
The number of floating-point multiplications is: 2000000000
```

Question 3(d)

```
Value of a for the fitted line is: 4.719354385844765
Value of b for the fitted line is: 3.129414619191207
Training error is: 5.490961211886349
Test error is: 5.131703873607279
```

Question 4(a)

```
Weight Vector: [0.01694442 1.49601981 0.03738886]
Bias Term: -2.625048955539647
```

Question 4(b)

```
Value of accuracy1: 0.856
Value of accuracy2: 0.856
Difference of accuracy2 and accuracy1: 0.0
```

Question 5(e)

```
The final weight vector is: [-2.63817506  0.01741015  1.50267082
    0.03800242]
The number of iterations is: 414
The learning rate is: 1
The weight vector in Question 4 is: [0.01694442 1.49601981
    0.03738886]
The bias term  in Question 4 is: -2.625048955539647
```

Question 6(abc)

```
Best value of K: 3
Accuracy of best K for reduced Test data: 0.9967567567567568
Accuracy of best K for reduced Validation data: 0.9852242744063324
```

Question 6(d)

```
Best value of K: 9
Accuracy of best K for reduced Test data: 0.9965174129353234
Accuracy of best K for reduced Validation data: 0.9951992318771004
```