Question 1(a):

[[0.37592619 0.01660407 0.07376876]

[0.0557796 0.37548766 0.89068463]

[0.58574287 0.00493422 0.53520128]

[0.58722016 0.02948346 0.77829943]]

Question 1(b):

[[0.9232264]

[0.76975006]

[0.73852136]

[0.66008045]]

Question 1(c):

[[0.37592619 0.01660407 0.07376876 0.0557796 0.37548766 0.89068463]

[0.58574287 0.00493422 0.53520128 0.58722016 0.02948346 0.77829943]]

Question 1(d):

[[1.29915259 0.93983047 0.99699516]

[0.82552966 1.14523772 1.66043469]

[1.32426423 0.74345558 1.27372264]

[1.24730061 0.68956391 1.43837988]]

Question 1(e):

[0.9232264 0.76975006 0.73852136 0.66008045]

Question 1(f):

[[0.9232264 0.01660407 0.07376876]

 [0.76975006 0.37548766 0.89068463]

 [0.73852136 0.00493422 0.53520128]

 [0.66008045 0.02948346 0.77829943]]

Question 1(g):

[[0.99699516 0.01660407 0.07376876]

 [1.66043469 0.37548766 0.89068463]

 [1.27372264 0.00493422 0.53520128]

 [1.43837988 0.02948346 0.77829943]]

Question 1(h):

[array([0.99699516, 1.66043469, 1.27372264, 1.43837988]), array([0.01660407, 0.37548766, 0.00493422, 0.02948346])]

Question 1(i):

[array([1.66043469, 0.37548766, 0.89068463]), array([1.43837988, 0.02948346, 0.77829943])]

Question 1(j):

[5.36953237 0.42650941 2.2779541]

Question 1(k):

[0.9969951615127677, 1.6604346922222688, 1.2737226370828845, 1.4383798833154748]

Question 1(l):

0.6728329898150626

Question 1(m):

[[-6.01872416e-03 -8.19621458e+00 -5.21363980e+00]

 [1.01415886e+00 -1.95905936e+00 -2.31529735e-01]

 [4.83887646e-01 -1.06231224e+01 -1.25022477e+00]

 [7.27034798e-01 -7.04785176e+00 -5.01287915e-01]]

Question 1(n):

[[4.08868978]

 [0.32746645]

 [1.66270763]]

Question 2 c)

N= 200

Numpy cube multiplication = 0.0

For loop cube multiplication = 22.9540000687

Magnitude difference = 9.094947017729282e-12

N= 2000

Numpy cube multiplication = 0.972000310636

For loop cube multiplication = 26215.939006

Magnitude difference = 3.2518213002777097e-09

Question 4

Question 4(a):

[[1. 0.13533528 0.60653066]

 [1. 0.60653066 1.]]

Question 4(b):

[[7.08833205e-01 -9.78320841e-01]

 [2.36276118e-01 -4.10812527e+00]

 [9.33835058e-02 2.31640827e+00]

 [1.85549541e-01 1.03971314e+00]

 [6.02332350e-01 -6.68427924e+00]

 [7.16493117e-01 1.04102597e+00]

 [8.30812740e-02 1.82826677e+00]

 [4.32429616e-01 -9.86930873e+00]

 [3.30507969e-01 -7.89704200e+00]

 [2.96555730e-03 -1.06060769e+01]

 [9.95242327e-01 3.71008631e+00]

[9.50996673e-01 9.29502946e+00]

[9.47572307e-01 1.13774619e+01]

[2.10790314e-01 -1.55045147e+00]

[2.34347572e-01 3.09801970e+00]]

[0.7088332 0.23627612 0.09338351 0.18554954 0.60233235 0.71649312

0.08308127 0.43242962 0.33050797 0.00296556 0.99524233 0.95099667

0.94757231 0.21079031 0.23434757]

Question 4(c):

Question 4(d):

Question 4(e):

Question 4(f):

M = 8 w = [-61.53882763 -10549.55566559   4063.78680233 16096.66588126

  -6484.81659134   1311.64720066   9698.18002227 -13217.21905886

   -776.23779436]

err_train = 2.188474165208811 err_test = 7.128180382255111

Question 5:

Question 5(a):

Question 5(b):

Question 5(c):

alpha = 0.01 w = [-54.00925081 6.86609108 2.13415301 15.60406784 8.4904623

14.11255525 6.71531265 15.41208278 10.05519171 -1.05068362

5.83225073 16.41405537 18.42321933 18.46844516 5.19156131

2.34580555]

training error = 3.865699721899921 training validation = 6.011807984804935 test error = 10.289966470079719

Question 6

Question 6(a):

Question 6(b):

Question 6(c):

Question 6(d):

w = [-4.38393833 0.07353853 -1.82501312 -1.75331732 -2.32759472 -0.81207169

2.44792713 2.50059333 -1.84191498 0.50517951 -0.72438818 1.03731702

3.90260448 0.56556473 -1.81628117 2.03382129] alpha = 1

training = 144.54212175980217 Mean validation = 822.0954813016485 testing = 94.69244079562188

Question 7

I don't know