(414, 8)

Question 1

Question 1(a):

[1. 2. 3. 4. 5. 6. 7. 8. 9. 10.]

Question 1(b):

[2012.917 2012.917 2013.583 2013.5   2012.833 2012.667 2012.667 2013.417

 2013.5   2013.417]

Question 1(d):

(414, 7)

Question 1(f):

(70, 7)

(344, 7)

Question 1(g):

(273, 7)

(71, 7)

Question 1(h):

[[32.   84.87882 10.   24.98298 121.54024]

 [5.   390.5684   5.   24.97937 121.54245]]

[37.9 43.1]

[[19.5   306.5947   9.   24.98034 121.53951]

 [34.5   623.4731   7.   24.97933 121.53642]]

[42.2 40.3]

[[13.3   561.9845   5.   24.98746 121.54391]

 [13.3   561.9845   5.   24.98746 121.54391]]

[47.3 54.8]

Question 1(i):

[2013.14897101   17.71256039 1083.88568891   4.0942029   24.96903007

  121.53336109   37.98019324]

[2.81626494e-01 1.13787172e+01 1.26058439e+03 2.94200221e+00

 1.23951994e-02 1.53286366e-02 1.35900448e+01]

[17.7018315 1029.6309178   4.05494505   24.96959267 121.53340674]

[1.15249195e+01 1.21117367e+03 2.84275045e+00 1.14181823e-02

 1.50324998e-02]

Question 1(l):

[[1.4 2.5 3.]

 [9.1 3.4 2.3]]

[10.5 5.9 5.3]

[[-9.1 -3.4 -2.3]

 [-1.4 -2.5 -3.]]

Question 1(m):

[[1.24063066 -0.78003025 2.09130384 1.17245685 0.45456578]

 [-1.10211889 -0.52763904 0.33244386 0.85629444 0.60158059]]

[1.08760172e-15 -1.28509332e-16 1.01668775e-16 -4.21720046e-13

 -4.74405822e-13]

Question 1(n):

Non-vectorized time: 1.8429961204528809

Vectorized time: 0.012003183364868164

Question 2

Question 2(a):

[4.93151815e+04 7.27783230e+03 3.49124023e+06 1.00237381e+04

 4.68901518e+04 3.45191975e+04 4.67881241e+06 5.74125724e+02

 2.02590444e+03 8.05369578e+04]

[16.4   289.3248   5.   24.98203 121.54348]

53.0

Question 2(b):

48.4

Question 2(c):

36.5

Question 2(d):

174.77563525607482

200.6520555038695

Question 2(e):

[2.545677655677656, 23.402637362637364, 33.75391127391128, 38.81804258241759, 43.769038827838834, 46.693162393162396, 51.464432981984, 54.095642742673995, 57.21185727852395, 58.80321098901099, 59.89691278418552, 60.23546245421245, 61.541609337408154, 61.737446736936526, 63.134434839234856, 64.11130394345237, 65.2640393170843, 66.2138081671415, 67.63257069800007, 69.35244203296705, 69.51671019079184, 70.0110742288015, 70.6711153811532, 69.35548000610501, 70.10270833699634, 69.76435994971499, 70.63859956687118, 70.68841420909024, 71.27089793678377, 72.13229401709401]

[96.90380281690139, 75.1262323943662, 70.73532081377151, 70.16405809859154, 70.86134647887324, 68.98659624413145, 70.61341189997124, 72.24152288732395, 72.42198226395408, 74.74239014084505, 74.60658479804447, 77.32889964788733, 79.78338611550961, 82.05927421672892, 83.43915492957747, 84.09591549295774, 83.79711584385204, 83.97218266388454, 83.24658577503804, 82.56646830985915, 82.811104404203, 83.0167332091724, 81.641431880508, 79.27247603677621, 82.21265239436615, 82.52379385782145, 82.23400142970301, 82.70106567979299, 82.88870677094673, 83.67681095461657]

Question 2(f):

[3.0816117216117225, 22.992408424908422, 29.71118437118437, 37.67307005494506, 42.79117509157509, 45.536583231583215, 48.48223592733796, 51.83131066849816, 54.687386605164384, 55.19630256410255, 55.18164229709686, 56.01946377696378, 56.47402193467284, 57.373671226732455, 58.022286039886026, 58.28442980196886, 59.379906713816744, 60.46701499118166, 61.348100514444006, 61.71432683150183, 62.57499921091757, 63.56482063391153, 64.39252151754985, 65.53403095746845, 65.65184797069597, 65.79180012788001, 66.22803810729737, 66.95946526687598, 67.38634056787446, 68.06599320309321]

[93.08704225352112, 77.31038732394366, 70.22596244131452, 83.25283450704225, 76.05908732394364, 71.91145148669798, 69.9449123311296, 70.2127420774648, 69.26568422882978, 67.00365633802818, 68.94937725526714, 69.8208313771518, 68.56777564797066, 68.94750718597301, 69.68439999999998, 70.24938160211268, 72.1741020517569, 72.91705007824726, 74.13080059303186, 75.07856654929576, 76.83044105905273, 76.9609597252939, 76.34524987353231, 78.20031274452268, 77.62949746478873, 77.68062526043838, 79.15300566085125, 79.70214752802531, 80.89930063137449, 81.92216338028169]

Question 3

Question 3(a):

[42.25538722 -0.2532634]

Question 3(c):

Question 3(d):

[5.24237889e+01 -1.83379775e+00 3.99166404e-02]

Question 3(f):

139.0357747767251

153.4632471105076

Question 3(g):

[174.77563525607482, 166.25600652655072, 139.0357747767251, 137.92733345645456, 137.9183442488486, 137.91306291158125, 137.17426920413558, 137.06614129884147, 133.54686060253812, 133.4807989900262, 133.53287822000016]

[200.65205550386946, 191.32220524236718, 153.4632471105076, 157.8994057501262, 158.5852433379228, 159.2502581297942, 175.26034349512477, 164.50045134688312, 349.83441019435566, 425.4313554123931, 339.3754978115222]

Question 4

Question 4(e):

[-1.]

Question 4(f):

[-1. -2.]

[-0.9994999999998755, -1.9979999999999998]

Question 4(g):

[42.23043921 -0.25227295]

Question 4(i):

[-5.76458975e+25 -1.45200979e+27]

Question 5

Question 5(b):

Question 5(e):

90.92383333333329