

Name: Linghao Shi
RIN: 661954958
Course: CSCI4390

Part 1(a)

Mean vector is:

[97.695 3.8019 21.6866 40.2597 20.3412 40.4204 22.2676 39.2425
20.8553 39.0269 19.5921 50.9493 7.9109 54.6091 20.2671 35.3882
22.0291 42.9362 19.4858 41.5524 7.4117 755.5226 79.7504 4.0398
38.3308 3.7607 24.988]

Total Varance var(D) is:

12504.288

Part 1(b)

Inner product is:

[[10510.8206 160.504 9.1296 35.0971 26.9952 -25.2281
17.4939 12.109 8.4363 7.5508 3.7368 6.4325
73.4507 -265.6251 5.5812 -29.1737 7.936 -50.3671
2.0676 -21.9028 54.0531 -26.4632 -232.6349 21.8936
0.2785 6.6023 -16.5635]
[160.504 62.9767 -0.2999 3.3778 -0.0978 1.6466
-1.5505 3.3875 -0.1436 3.9596 -1.1527 10.1116
-3.8195 38.0074 -2.2663 1.4233 -1.1093 0.5354
-2.5196 -0.2888 -3.1405 -0.621 8.1051 1.1726
1.8755 -1.2091 0.0599]
[9.1296 -0.2999 2.5793 1.0481 2.9472 -0.0164
2.8751 -0.1492 2.8773 0.6823 2.6225 -0.2142
6.4043 -30.7683 2.842 1.1103 2.5931 -0.054
2.7334 0.4784 5.8313 -1.7893 -8.2677 -0.3451
-1.4436 3.8486 -0.1444]
[35.0971 3.3778 1.0481 15.834 2.3546 12.9154
2.0214 10.9388 0.8631 15.2078 1.5105 10.8868
7.6614 30.3829 0.1796 16.3028 -0.2339 15.3042
0.924 12.6207 7.2101 -8.655 16.2537 1.9988
-0.9883 10.6673 -0.0403]
[26.9952 -0.0978 2.9472 2.3546 4.8089 -1.478
3.2344 0.8671 3.4139 2.2045 2.9146 0.5855
10.7001 -39.6436 3.0707 2.5706 2.4802 0.7851
2.9845 1.4324 9.238 -2.1585 -16.5109 0.2822
-1.8033 5.3589 -0.3525]
[-25.2281 1.6466 -0.0164 12.9154 -1.478 16.5625
1.1211 8.9843 -0.3933 12.7459 0.8288 9.189
-0.2397 49.4308 -0.4416 14.373 -0.3266 14.4528
0.4472 11.4289 0.7287 -7.6982 35.4699 0.6902
-0.2576 8.5208 0.3702]
[17.4939 -1.5505 2.8751 2.0214 3.2344 1.1211

	4.0243	-0.0733	3.4947	1.0689	3.2865	-1.2009
	8.3918	-40.471	3.5867	1.771	3.1208	0.4656
	3.6427	1.121	7.4605	-2.8199	-8.421	-0.4955
	-2.4207	5.4348	-0.1511]			
[	12.109	3.3875	-0.1492	10.9388	0.8671	8.9843
	-0.0733	10.5917	-0.9338	12.7012	-0.3005	11.0229
	1.5229	52.1988	-1.7173	13.859	-1.8031	14.0918
	-1.2803	11.2617	2.0456	-5.6174	17.2733	2.0995
	0.6541	5.6568	-0.0225]			
[	8.4363	-0.1436	2.8773	0.8631	3.4139	-0.3933
	3.4947	-0.9338	4.1732	-0.4314	3.2851	-1.4097
	8.116	-44.7429	3.7834	0.4547	3.1818	-1.0159
	3.6606	-0.2167	7.2069	-1.1381	-11.8289	-0.9301
	-2.5243	4.4512	-0.0537]			
[	7.5508	3.9596	0.6823	15.2078	2.2045	12.7459
	1.0689	12.7012	-0.4314	18.8461	0.7352	13.8094
	6.8489	53.032	-1.2018	19.8546	-1.4187	19.2154
	-0.3894	15.4375	6.7701	-8.0544	21.7874	3.1943
	0.135	11.2263	-0.1124]			
[	3.7368	-1.1527	2.6225	1.5105	2.9146	0.8288
	3.2865	-0.3005	3.2851	0.7352	3.4025	0.5456
	7.0679	-36.3347	3.3884	1.4047	2.9767	0.1579
	3.3857	0.5537	6.3882	-2.3339	-7.5297	-0.6556
	-1.8311	4.5522	-0.1468]			
[	6.4325	10.1116	-0.2142	10.8868	0.5855	9.189
	-1.2009	11.0229	-1.4097	13.8094	0.5456	81.393
	-4.3042	74.1322	-2.7187	15.0322	-1.5352	16.96
	-2.5175	10.1946	-2.5485	-7.9657	24.9963	1.8143
	-1.3975	2.9583	-1.446]			
[	73.4507	-3.8195	6.4043	7.6614	10.7001	-0.2397
	8.3918	1.5229	8.116	6.8489	7.0679	-4.3042
	37.0904	-127.5067	7.9552	7.9757	5.7521	2.3456
	8.186	4.6628	31.5667	-6.3828	-51.6465	2.5256
	-5.8407	19.523	-1.3319]			
[	-265.6251	38.0074	-30.7683	30.3829	-39.6436	49.4308
	-40.471	52.1988	-44.7429	53.032	-36.3347	74.1322
	-127.5067	970.2612	-49.553	56.9049	-40.572	79.6692
	-46.372	50.6829	-106.2622	-15.1688	333.5266	7.5066
	39.9367	-34.025	5.2701]			
[	5.5812	-2.2663	2.842	0.1796	3.0707	-0.4416
	3.5867	-1.7173	3.7834	-1.2018	3.3884	-2.7187
	7.9552	-49.553	4.4518	-0.3663	3.6408	-2.3144
	4.0161	-0.6805	7.0826	-1.5257	-12.9284	-0.9614
	-2.7396	4.1297	-0.1193]			
[	-29.1737	1.4233	1.1103	16.3028	2.5706	14.373
	1.771	13.859	0.4547	19.8546	1.4047	15.0322
	7.9757	56.9049	-0.3663	26.1538	-1.2415	23.6175
	0.2891	18.2304	8.0001	-10.0598	28.8444	2.6698
	-0.4333	13.7686	0.1349]			
[	7.936	-1.1093	2.5931	-0.2339	2.4802	-0.3266

3.1208	-1.8031	3.1818	-1.4187	2.9767	-1.5352
5.7521	-40.572	3.6408	-1.2415	3.8264	-2.1412
3.426	-1.2735	5.2302	-2.3571	-8.757	-1.0495
-1.3865	3.2148	-0.091]		
[-50.3671	0.5354	-0.054	15.3042	0.7851	14.4528
0.4656	14.0918	-1.0159	19.2154	0.1579	16.96
2.3456	79.6692	-2.3144	23.6175	-2.1412	27.2926
-1.1895	18.5607	3.254	-8.7203	37.938	2.5916
2.8453	10.9955	0.3393]		
[2.0676	-2.5196	2.7334	0.924	2.9845	0.4472
3.6427	-1.2803	3.6606	-0.3894	3.3857	-2.5175
8.186	-46.372	4.0161	0.2891	3.426	-1.1895
4.0589	-0.0726	7.1583	-2.3378	-9.5718	-0.8778
-2.4692	4.9139	-0.0358]		
[-21.9028	-0.2888	0.4784	12.6207	1.4324	11.4289
1.121	11.2617	-0.2167	15.4375	0.5537	10.1946
4.6628	50.6829	-0.6805	18.2304	-1.2735	18.5607
-0.0726	17.2341	4.9285	-5.644	22.2306	2.4285
0.4244	9.4088	-0.1778]		
[54.0531	-3.1405	5.8313	7.2101	9.238	0.7287
7.4605	2.0456	7.2069	6.7701	6.3882	-2.5485
31.5667	-106.2622	7.0826	8.0001	5.2302	3.254
7.1583	4.9285	28.2734	-5.636	-45.4943	2.5146
-4.852	17.6345	-1.1729]		
[-26.4632	-0.621	-1.7893	-8.655	-2.1585	-7.6982
-2.8199	-5.6174	-1.1381	-8.0544	-2.3339	-7.9657
-6.3828	-15.1688	-1.5257	-10.0598	-2.3571	-8.7203
-2.3378	-5.644	-5.636	54.7489	-10.1452	-4.2627
3.5183	-7.5759	0.075]		
[-232.6349	8.1051	-8.2677	16.2537	-16.5109	35.4699
-8.421	17.2733	-11.8289	21.7874	-7.5297	24.9963
-51.6465	333.5266	-12.9284	28.8444	-8.757	37.938
-9.5718	22.2306	-45.4943	-10.1452	222.0312	-6.445
14.6088	2.2817	4.4153]		
[21.8936	1.1726	-0.3451	1.9988	0.2822	0.6902
-0.4955	2.0995	-0.9301	3.1943	-0.6556	1.8143
2.5256	7.5066	-0.9614	2.6698	-1.0495	2.5916
-0.8778	2.4285	2.5146	-4.2627	-6.445	6.0082
-0.2173	1.2952	-0.403]		
[0.2785	1.8755	-1.4436	-0.9883	-1.8033	-0.2576
-2.4207	0.6541	-2.5243	0.135	-1.8311	-1.3975
-5.8407	39.9367	-2.7396	-0.4333	-1.3865	2.8453
-2.4692	0.4244	-4.852	3.5183	14.6088	-0.2173
139.1083	-2.0872	-1.0068]		
[6.6023	-1.2091	3.8486	10.6673	5.3589	8.5208
5.4348	5.6568	4.4512	11.2263	4.5522	2.9583
19.523	-34.025	4.1297	13.7686	3.2148	10.9955
4.9139	9.4088	17.6345	-7.5759	2.2817	1.2952
-2.0872	17.5942	-0.2397]		
[-16.5635	0.0599	-0.1444	-0.0403	-0.3525	0.3702

-0.1511 -0.0225 -0.0537 -0.1124 -0.1468 -1.446
-1.3319 5.2701 -0.1193 0.1349 -0.091 0.3393
-0.0358 -0.1778 -1.1729 0.075 4.4153 -0.403
-1.0068 -0.2397 210.1417]]

Outer product is:

[[10510.8206 160.504 9.1296 35.0971 26.9952 -25.2281
17.4939 12.109 8.4363 7.5508 3.7368 6.4325
73.4507 -265.6251 5.5812 -29.1737 7.936 -50.3671
2.0676 -21.9028 54.0531 -26.4632 -232.6349 21.8936
0.2785 6.6023 -16.5635]
[160.504 62.9767 -0.2999 3.3778 -0.0978 1.6466
-1.5505 3.3875 -0.1436 3.9596 -1.1527 10.1116
-3.8195 38.0074 -2.2663 1.4233 -1.1093 0.5354
-2.5196 -0.2888 -3.1405 -0.621 8.1051 1.1726
1.8755 -1.2091 0.0599]
[9.1296 -0.2999 2.5793 1.0481 2.9472 -0.0164
2.8751 -0.1492 2.8773 0.6823 2.6225 -0.2142
6.4043 -30.7683 2.842 1.1103 2.5931 -0.054
2.7334 0.4784 5.8313 -1.7893 -8.2677 -0.3451
-1.4436 3.8486 -0.1444]
[35.0971 3.3778 1.0481 15.834 2.3546 12.9154
2.0214 10.9388 0.8631 15.2078 1.5105 10.8868
7.6614 30.3829 0.1796 16.3028 -0.2339 15.3042
0.924 12.6207 7.2101 -8.655 16.2537 1.9988
-0.9883 10.6673 -0.0403]
[26.9952 -0.0978 2.9472 2.3546 4.8089 -1.478
3.2344 0.8671 3.4139 2.2045 2.9146 0.5855
10.7001 -39.6436 3.0707 2.5706 2.4802 0.7851
2.9845 1.4324 9.238 -2.1585 -16.5109 0.2822
-1.8033 5.3589 -0.3525]
[-25.2281 1.6466 -0.0164 12.9154 -1.478 16.5625
1.1211 8.9843 -0.3933 12.7459 0.8288 9.189
-0.2397 49.4308 -0.4416 14.373 -0.3266 14.4528
0.4472 11.4289 0.7287 -7.6982 35.4699 0.6902
-0.2576 8.5208 0.3702]
[17.4939 -1.5505 2.8751 2.0214 3.2344 1.1211
4.0243 -0.0733 3.4947 1.0689 3.2865 -1.2009
8.3918 -40.471 3.5867 1.771 3.1208 0.4656
3.6427 1.121 7.4605 -2.8199 -8.421 -0.4955
-2.4207 5.4348 -0.1511]
[12.109 3.3875 -0.1492 10.9388 0.8671 8.9843
-0.0733 10.5917 -0.9338 12.7012 -0.3005 11.0229
1.5229 52.1988 -1.7173 13.859 -1.8031 14.0918
-1.2803 11.2617 2.0456 -5.6174 17.2733 2.0995
0.6541 5.6568 -0.0225]
[8.4363 -0.1436 2.8773 0.8631 3.4139 -0.3933
3.4947 -0.9338 4.1732 -0.4314 3.2851 -1.4097
8.116 -44.7429 3.7834 0.4547 3.1818 -1.0159

	3.6606	-0.2167	7.2069	-1.1381	-11.8289	-0.9301
	-2.5243	4.4512	-0.0537]			
[	7.5508	3.9596	0.6823	15.2078	2.2045	12.7459
	1.0689	12.7012	-0.4314	18.8461	0.7352	13.8094
	6.8489	53.032	-1.2018	19.8546	-1.4187	19.2154
	-0.3894	15.4375	6.7701	-8.0544	21.7874	3.1943
	0.135	11.2263	-0.1124]			
[	3.7368	-1.1527	2.6225	1.5105	2.9146	0.8288
	3.2865	-0.3005	3.2851	0.7352	3.4025	0.5456
	7.0679	-36.3347	3.3884	1.4047	2.9767	0.1579
	3.3857	0.5537	6.3882	-2.3339	-7.5297	-0.6556
	-1.8311	4.5522	-0.1468]			
[	6.4325	10.1116	-0.2142	10.8868	0.5855	9.189
	-1.2009	11.0229	-1.4097	13.8094	0.5456	81.393
	-4.3042	74.1322	-2.7187	15.0322	-1.5352	16.96
	-2.5175	10.1946	-2.5485	-7.9657	24.9963	1.8143
	-1.3975	2.9583	-1.446]			
[	73.4507	-3.8195	6.4043	7.6614	10.7001	-0.2397
	8.3918	1.5229	8.116	6.8489	7.0679	-4.3042
	37.0904	-127.5067	7.9552	7.9757	5.7521	2.3456
	8.186	4.6628	31.5667	-6.3828	-51.6465	2.5256
	-5.8407	19.523	-1.3319]			
[	-265.6251	38.0074	-30.7683	30.3829	-39.6436	49.4308
	-40.471	52.1988	-44.7429	53.032	-36.3347	74.1322
	-127.5067	970.2612	-49.553	56.9049	-40.572	79.6692
	-46.372	50.6829	-106.2622	-15.1688	333.5266	7.5066
	39.9367	-34.025	5.2701]			
[	5.5812	-2.2663	2.842	0.1796	3.0707	-0.4416
	3.5867	-1.7173	3.7834	-1.2018	3.3884	-2.7187
	7.9552	-49.553	4.4518	-0.3663	3.6408	-2.3144
	4.0161	-0.6805	7.0826	-1.5257	-12.9284	-0.9614
	-2.7396	4.1297	-0.1193]			
[	-29.1737	1.4233	1.1103	16.3028	2.5706	14.373
	1.771	13.859	0.4547	19.8546	1.4047	15.0322
	7.9757	56.9049	-0.3663	26.1538	-1.2415	23.6175
	0.2891	18.2304	8.0001	-10.0598	28.8444	2.6698
	-0.4333	13.7686	0.1349]			
[	7.936	-1.1093	2.5931	-0.2339	2.4802	-0.3266
	3.1208	-1.8031	3.1818	-1.4187	2.9767	-1.5352
	5.7521	-40.572	3.6408	-1.2415	3.8264	-2.1412
	3.426	-1.2735	5.2302	-2.3571	-8.757	-1.0495
	-1.3865	3.2148	-0.091]			
[	-50.3671	0.5354	-0.054	15.3042	0.7851	14.4528
	0.4656	14.0918	-1.0159	19.2154	0.1579	16.96
	2.3456	79.6692	-2.3144	23.6175	-2.1412	27.2926
	-1.1895	18.5607	3.254	-8.7203	37.938	2.5916
	2.8453	10.9955	0.3393]			
[	2.0676	-2.5196	2.7334	0.924	2.9845	0.4472
	3.6427	-1.2803	3.6606	-0.3894	3.3857	-2.5175
	8.186	-46.372	4.0161	0.2891	3.426	-1.1895

```

4.0589 -0.0726 7.1583 -2.3378 -9.5718 -0.8778
-2.4692 4.9139 -0.0358]
[ -21.9028 -0.2888 0.4784 12.6207 1.4324 11.4289
1.121 11.2617 -0.2167 15.4375 0.5537 10.1946
4.6628 50.6829 -0.6805 18.2304 -1.2735 18.5607
-0.0726 17.2341 4.9285 -5.644 22.2306 2.4285
0.4244 9.4088 -0.1778]
[ 54.0531 -3.1405 5.8313 7.2101 9.238 0.7287
7.4605 2.0456 7.2069 6.7701 6.3882 -2.5485
31.5667 -106.2622 7.0826 8.0001 5.2302 3.254
7.1583 4.9285 28.2734 -5.636 -45.4943 2.5146
-4.852 17.6345 -1.1729]
[ -26.4632 -0.621 -1.7893 -8.655 -2.1585 -7.6982
-2.8199 -5.6174 -1.1381 -8.0544 -2.3339 -7.9657
-6.3828 -15.1688 -1.5257 -10.0598 -2.3571 -8.7203
-2.3378 -5.644 -5.636 54.7489 -10.1452 -4.2627
3.5183 -7.5759 0.075 ]
[ -232.6349 8.1051 -8.2677 16.2537 -16.5109 35.4699
-8.421 17.2733 -11.8289 21.7874 -7.5297 24.9963
-51.6465 333.5266 -12.9284 28.8444 -8.757 37.938
-9.5718 22.2306 -45.4943 -10.1452 222.0312 -6.445
14.6088 2.2817 4.4153]
[ 21.8936 1.1726 -0.3451 1.9988 0.2822 0.6902
-0.4955 2.0995 -0.9301 3.1943 -0.6556 1.8143
2.5256 7.5066 -0.9614 2.6698 -1.0495 2.5916
-0.8778 2.4285 2.5146 -4.2627 -6.445 6.0082
-0.2173 1.2952 -0.403 ]
[ 0.2785 1.8755 -1.4436 -0.9883 -1.8033 -0.2576
-2.4207 0.6541 -2.5243 0.135 -1.8311 -1.3975
-5.8407 39.9367 -2.7396 -0.4333 -1.3865 2.8453
-2.4692 0.4244 -4.852 3.5183 14.6088 -0.2173
139.1083 -2.0872 -1.0068]
[ 6.6023 -1.2091 3.8486 10.6673 5.3589 8.5208
5.4348 5.6568 4.4512 11.2263 4.5522 2.9583
19.523 -34.025 4.1297 13.7686 3.2148 10.9955
4.9139 9.4088 17.6345 -7.5759 2.2817 1.2952
-2.0872 17.5942 -0.2397]
[ -16.5635 0.0599 -0.1444 -0.0403 -0.3525 0.3702
-0.1511 -0.0225 -0.0537 -0.1124 -0.1468 -1.446
-1.3319 5.2701 -0.1193 0.1349 -0.091 0.3393
-0.0358 -0.1778 -1.1729 0.075 4.4153 -0.403
-1.0068 -0.2397 210.1417]]

```

Part 1(c)

Correlation matrix is:

```

[[ 1.    0.1973 0.0554 0.086 0.1201 -0.0605 0.0851 0.0363 0.0403
0.017 0.0198 0.007 0.1176 -0.0832 0.0258 -0.0556 0.0396 -0.094
0.01 -0.0515 0.0992 -0.0349 -0.1523 0.0871 0.0002 0.0154 -0.0111]
[ 0.1973 1.    -0.0235 0.107 -0.0056 0.051 -0.0974 0.1312 -0.0089

```

0.1149 -0.0787 0.1412 -0.079 0.1538 -0.1353 0.0351 -0.0715 0.0129
-0.1576 -0.0088 -0.0744 -0.0106 0.0685 0.0603 0.02 -0.0363 0.0005]
[0.0554 -0.0235 1. 0.164 0.8368 -0.0025 0.8924 -0.0286 0.877
0.0979 0.8852 -0.0148 0.6548 -0.615 0.8387 0.1352 0.8254 -0.0064
0.8448 0.0718 0.6828 -0.1506 -0.3455 -0.0877 -0.0762 0.5713 -0.0062]
[0.086 0.107 0.164 1. 0.2698 0.7975 0.2532 0.8447 0.1062
0.8804 0.2058 0.3033 0.3161 0.2451 0.0214 0.8011 -0.0301 0.7362
0.1153 0.764 0.3408 -0.294 0.2741 0.2049 -0.0211 0.6391 -0.0007]
[0.1201 -0.0056 0.8368 0.2698 1. -0.1656 0.7352 0.1215 0.7621
0.2316 0.7206 0.0296 0.8012 -0.5804 0.6637 0.2292 0.5782 0.0685
0.6755 0.1573 0.7923 -0.133 -0.5053 0.0525 -0.0697 0.5826 -0.0111]
[-0.0605 0.051 -0.0025 0.7975 -0.1656 1. 0.1373 0.6783 -0.0473
0.7214 0.1104 0.2503 -0.0097 0.3899 -0.0514 0.6906 -0.041 0.6798
0.0545 0.6765 0.0337 -0.2556 0.5849 0.0692 -0.0054 0.4992 0.0063]
[0.0851 -0.0974 0.8924 0.2532 0.7352 0.1373 1. -0.0112 0.8528
0.1227 0.8882 -0.0664 0.6869 -0.6477 0.8474 0.1726 0.7953 0.0444
0.9013 0.1346 0.6994 -0.19 -0.2817 -0.1008 -0.1023 0.6459 -0.0052]
[0.0363 0.1312 -0.0286 0.8447 0.1215 0.6783 -0.0112 1. -0.1405
0.899 -0.0501 0.3754 0.0768 0.5149 -0.2501 0.8327 -0.2832 0.8288
-0.1953 0.8335 0.1182 -0.2333 0.3562 0.2632 0.017 0.4144 -0.0005]
[0.0403 -0.0089 0.877 0.1062 0.7621 -0.0473 0.8528 -0.1405 1.
-0.0487 0.8718 -0.0765 0.6523 -0.7031 0.8778 0.0435 0.7963 -0.0952
0.8894 -0.0255 0.6635 -0.0753 -0.3886 -0.1857 -0.1048 0.5195 -0.0018]
[0.017 0.1149 0.0979 0.8804 0.2316 0.7214 0.1227 0.899 -0.0487
1. 0.0918 0.3526 0.259 0.3922 -0.1312 0.8943 -0.1671 0.8473
-0.0445 0.8566 0.2933 -0.2507 0.3368 0.3002 0.0026 0.6165 -0.0018]
[0.0198 -0.0787 0.8852 0.2058 0.7206 0.1104 0.8882 -0.0501 0.8718
0.0918 1. 0.0328 0.6292 -0.6324 0.8706 0.1489 0.825 0.0164
0.9111 0.0723 0.6513 -0.171 -0.274 -0.145 -0.0842 0.5884 -0.0055]
[0.007 0.1412 -0.0148 0.3033 0.0296 0.2503 -0.0664 0.3754 -0.0765
0.3526 0.0328 1. -0.0783 0.2638 -0.1428 0.3258 -0.087 0.3598
-0.1385 0.2722 -0.0531 -0.1193 0.1859 0.082 -0.0131 0.0782 -0.0111]
[0.1176 -0.079 0.6548 0.3161 0.8012 -0.0097 0.6869 0.0768 0.6523
0.259 0.6292 -0.0783 1. -0.6721 0.6191 0.2561 0.4828 0.0737
0.6672 0.1844 0.9748 -0.1416 -0.5691 0.1692 -0.0813 0.7642 -0.0151]
[-0.0832 0.1538 -0.615 0.2451 -0.5804 0.3899 -0.6477 0.5149 -0.7031
0.3922 -0.6324 0.2638 -0.6721 1. -0.754 0.3572 -0.6659 0.4896
-0.7389 0.3919 -0.6416 -0.0658 0.7186 0.0983 0.1087 -0.2604 0.0117]
[0.0258 -0.1353 0.8387 0.0214 0.6637 -0.0514 0.8474 -0.2501 0.8778
-0.1312 0.8706 -0.1428 0.6191 -0.754 1. -0.0339 0.8821 -0.21
0.9448 -0.0777 0.6313 -0.0977 -0.4112 -0.1859 -0.1101 0.4666 -0.0039]
[-0.0556 0.0351 0.1352 0.8011 0.2292 0.6906 0.1726 0.8327 0.0435
0.8943 0.1489 0.3258 0.2561 0.3572 -0.0339 1. -0.1241 0.884
0.0281 0.8587 0.2942 -0.2658 0.3785 0.213 -0.0072 0.6419 0.0018]
[0.0396 -0.0715 0.8254 -0.0301 0.5782 -0.041 0.7953 -0.2832 0.7963
-0.1671 0.825 -0.087 0.4828 -0.6659 0.8821 -0.1241 1. -0.2095
0.8693 -0.1568 0.5028 -0.1629 -0.3004 -0.2189 -0.0601 0.3918 -0.0032]
[-0.094 0.0129 -0.0064 0.7362 0.0685 0.6798 0.0444 0.8288 -0.0952
0.8473 0.0164 0.3598 0.0737 0.4896 -0.21 0.884 -0.2095 1.
-0.113 0.8558 0.1171 -0.2256 0.4874 0.2024 0.0462 0.5018 0.0045]

```
[ 0.01 -0.1576 0.8448 0.1153 0.6755 0.0545 0.9013 -0.1953 0.8894
-0.0445 0.9111 -0.1385 0.6672 -0.7389 0.9448 0.0281 0.8693 -0.113
1. -0.0087 0.6682 -0.1568 -0.3188 -0.1778 -0.1039 0.5815 -0.0012]
[-0.0515 -0.0088 0.0718 0.764 0.1573 0.6765 0.1346 0.8335 -0.0255
0.8566 0.0723 0.2722 0.1844 0.3919 -0.0777 0.8587 -0.1568 0.8558
-0.0087 1. 0.2233 -0.1837 0.3594 0.2387 0.0087 0.5403 -0.003 ]
[ 0.0992 -0.0744 0.6828 0.3408 0.7923 0.0337 0.6994 0.1182 0.6635
0.2933 0.6513 -0.0531 0.9748 -0.6416 0.6313 0.2942 0.5028 0.1171
0.6682 0.2233 1. -0.1432 -0.5742 0.1929 -0.0774 0.7907 -0.0152]
[-0.0349 -0.0106 -0.1506 -0.294 -0.133 -0.2556 -0.19 -0.2333 -0.0753
-0.2507 -0.171 -0.1193 -0.1416 -0.0658 -0.0977 -0.2658 -0.1629 -0.2256
-0.1568 -0.1837 -0.1432 1. -0.092 -0.235 0.0403 -0.2441 0.0007]
[-0.1523 0.0685 -0.3455 0.2741 -0.5053 0.5849 -0.2817 0.3562 -0.3886
0.3368 -0.274 0.1859 -0.5691 0.7186 -0.4112 0.3785 -0.3004 0.4874
-0.3188 0.3594 -0.5742 -0.092 1. -0.1765 0.0831 0.0365 0.0204]
[ 0.0871 0.0603 -0.0877 0.2049 0.0525 0.0692 -0.1008 0.2632 -0.1857
0.3002 -0.145 0.082 0.1692 0.0983 -0.1859 0.213 -0.2189 0.2024
-0.1778 0.2387 0.1929 -0.235 -0.1765 1. -0.0075 0.126 -0.0113]
[ 0.0002 0.02 -0.0762 -0.0211 -0.0697 -0.0054 -0.1023 0.017 -0.1048
0.0026 -0.0842 -0.0131 -0.0813 0.1087 -0.1101 -0.0072 -0.0601 0.0462
-0.1039 0.0087 -0.0774 0.0403 0.0831 -0.0075 1. -0.0422 -0.0059]
[ 0.0154 -0.0363 0.5713 0.6391 0.5826 0.4992 0.6459 0.4144 0.5195
0.6165 0.5884 0.0782 0.7642 -0.2604 0.4666 0.6419 0.3918 0.5018
0.5815 0.5403 0.7907 -0.2441 0.0365 0.126 -0.0422 1. -0.0039]
[-0.0111 0.0005 -0.0062 -0.0007 -0.0111 0.0063 -0.0052 -0.0005 -0.0018
-0.0018 -0.0055 -0.0111 -0.0151 0.0117 -0.0039 0.0018 -0.0032 0.0045
-0.0012 -0.003 -0.0152 0.0007 0.0204 -0.0113 -0.0059 -0.0039 1. ]]
```

Part2 results:

Dominant eigenvalue: 10528.126; Error: 0.00; input epsilon: 0.001

Dominant eigenvector [0.9991 0.0152 0.001 0.0032 0.0027 -0.0026 0.0018 0.001 0.001
0.0005 0.0005 0.0004 0.0075 -0.0288 0.0007 -0.003 0.0009 -0.0051
0.0004 -0.0023 0.0056 -0.0025 -0.0236 0.0021 -0.0001 0.0007 -0.0016];