RELAZIONE LABORATORIO 2 MATLAB

Laboratorio eseguito da (in ordine alfabetico):
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Esercizio 1

Scopo di questo esercizio, è quello di confrontare i risultati ottenuti calcolando gli autovalori e autovettori della matrice A e della sua trasposta.

--- Usando la funzione Matlab "svd", calcolare e confrontare le decomposizioni ai valori singolari di A e At.

Di seguito i risultati ottenuti:

```
svdA =

Diagonal Matrix

9.61796       0       0
      0 2.82800       0
      0       0 0.41426
      0       0       0
      0       0       0
      0       0       0
      0       0       0
      0       0       0
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      0       0       0
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      0       0       0
      0       0       0
      0       0       0
      0       0       0
      0       0       0

svdAt =

Columns 1 through 7
```

```
    9.6180         0         0         0         0         0         0
         0    2.8280         0         0         0         0         0
         0         0    0.4143         0         0         0         0

  Columns 8 through 14

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 15 through 21

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 22 through 28

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 29 through 35

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 36 through 42

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 43 through 49

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 50 through 56

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 57 through 63

         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 64 through 65

         0         0
         0         0
         0         0
```

OSSERVAZIONI

Si osserva che entrambe le matrici presentano gli stessi valori sulle prime 3 colonne, l'unica differenza sta nelle dimensioni della matrice(rispettivamente 65x3 e 3x65).
In entrambe tutti gli altri valori sono nulli.
Si precisa che la prima (65x3) è una matrice diagonale.

---Confrontare i valori singolari di A con gli autovalori di AAt e AtA. Cosa si può osservare?

Di seguito i risultati ottenuti:

```
autovalAAt =

   -0.0000
   -0.0000
   -0.0000
   -0.0000
   -0.0000
   -0.0000
   -0.0000
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```

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  -0.0000
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   0.0000
   0.0000
   0.1716
   7.9976
  92.5052

autovalAtA =

   0.1716
   7.9976
  92.5052


svdA =

Diagonal Matrix

   9.61796         0         0
         0   2.82800         0
         0         0   0.41426
         0         0         0
         0         0         0
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OSSERVAZIONI

Si nota che gli autovalori (non nulli) delle due matrici AAt e AtA sono identici,mentre i valori singolari di A differiscono di molto.
Si nota inoltre che alcuni valori sono negativi ma ciò probabilmente è dato dalla precisione di matlab.

---Usando la funzione Matlab “orth”, confrontare l’immagine di A (risp. At) con la matrice dei vettori singolari sinistri di A (risp. At).

Di seguito i risultati ottenuti:

immagineA =

-0.0862	0.1929	-0.2927
-0.0870	0.1899	-0.2671
-0.0878	0.1868	-0.2424
-0.0886	0.1836	-0.2185
-0.0894	0.1803	-0.1953
-0.0902	0.1769	-0.1729
-0.0911	0.1733	-0.1513
-0.0920	0.1697	-0.1305
-0.0928	0.1659	-0.1104
-0.0937	0.1621	-0.0912
-0.0946	0.1581	-0.0727
-0.0956	0.1541	-0.0550
-0.0965	0.1499	-0.0381
-0.0975	0.1456	-0.0219
-0.0985	0.1412	-0.0066
-0.0994	0.1367	0.0080
-0.1005	0.1320	0.0218
-0.1015	0.1273	0.0349
-0.1025	0.1225	0.0471
-0.1036	0.1175	0.0586
-0.1047	0.1125	0.0692
-0.1058	0.1073	0.0791
-0.1069	0.1020	0.0883
-0.1080	0.0967	0.0966
-0.1091	0.0912	0.1041
-0.1103	0.0856	0.1109
-0.1114	0.0798	0.1169

```
-0.1126   0.0740   0.1221
-0.1138   0.0681   0.1266
-0.1151   0.0621   0.1302
-0.1163   0.0559   0.1331
-0.1176   0.0497   0.1352
-0.1188   0.0433   0.1365
-0.1201   0.0368   0.1371
-0.1214   0.0302   0.1368
-0.1227   0.0235   0.1358
-0.1241   0.0167   0.1340
-0.1254   0.0098   0.1314
-0.1268   0.0028   0.1280
-0.1282  -0.0043   0.1239
-0.1296  -0.0116   0.1189
-0.1310  -0.0189   0.1132
-0.1324  -0.0264   0.1067
-0.1338  -0.0339   0.0995
-0.1353  -0.0416   0.0914
-0.1368  -0.0494   0.0826
-0.1383  -0.0573   0.0730
-0.1398  -0.0653   0.0626
-0.1413  -0.0734   0.0514
-0.1429  -0.0816   0.0395
-0.1444  -0.0900   0.0267
-0.1460  -0.0984   0.0132
-0.1476  -0.1069  -0.0011
-0.1492  -0.1156  -0.0162
-0.1508  -0.1244  -0.0320
-0.1525  -0.1332  -0.0487
-0.1541  -0.1422  -0.0661
-0.1558  -0.1513  -0.0843
-0.1575  -0.1605  -0.1032
-0.1592  -0.1698  -0.1230
-0.1609  -0.1793  -0.1435
-0.1627  -0.1888  -0.1649
-0.1644  -0.1984  -0.1870
-0.1662  -0.2082  -0.2098
-0.1680  -0.2180  -0.2335


    immagineAt =

-0.8223   0.5535   0.1321
-0.4642  -0.5181  -0.7184
-0.3292  -0.6520   0.6830
```

OSSERVAZIONI

Si nota che l'immagine di A ci restituisce una matrice 65x3, mentre l'immagine dellla sua trasposta ci restituisce una matrice 3x3.

Procediamo ora confrontando le due matrici con le rispettive matrici dei vettori singolari sinistri:

```
    U =

    Columns 1 through 8:

-8.6245e-02   1.9286e-01  -2.9265e-01  -1.5127e-01  -1.4843e-01  -1.4567e-01  -1.4300e-01  -1.4042e-01
-8.7011e-02   1.8988e-01  -2.6714e-01  -1.8920e-01  -1.8162e-01  -1.7407e-01  -1.6655e-01  -1.5907e-01
-8.7795e-02   1.8679e-01  -2.4242e-01  -1.7570e-01  -1.5302e-01  -1.3115e-01  -1.1007e-01  -8.9804e-02
-8.8594e-02   1.8359e-01  -2.1847e-01   9.4331e-01  -5.2880e-02  -4.9176e-02  -4.5576e-02  -4.2081e-02
-8.9409e-02   1.8028e-01  -1.9530e-01  -5.3265e-02   9.5011e-01  -4.6604e-02  -4.3407e-02  -4.0300e-02
-9.0241e-02   1.7686e-01  -1.7291e-01  -4.9932e-02  -4.6975e-02   9.5591e-01  -4.1287e-02  -3.8556e-02
-9.1089e-02   1.7333e-01  -1.5131e-01  -4.6691e-02  -4.4138e-02  -4.1646e-02   9.6078e-01  -3.6848e-02
-9.1953e-02   1.6969e-01  -1.3048e-01  -4.3541e-02  -4.1376e-02  -3.9261e-02  -3.7194e-02   9.6482e-01
-9.2833e-02   1.6595e-01  -1.1044e-01  -4.0481e-02  -3.8692e-02  -3.6938e-02  -3.5221e-02  -3.3540e-02
-9.3729e-02   1.6209e-01  -9.1172e-02  -3.7513e-02  -3.6084e-02  -3.4678e-02  -3.3298e-02  -3.1941e-02
-9.4642e-02   1.5813e-01  -7.2688e-02  -3.4636e-02  -3.3552e-02  -3.2481e-02  -3.1423e-02  -3.0377e-02
-9.5571e-02   1.5405e-01  -5.4984e-02  -3.1850e-02  -3.1097e-02  -3.0346e-02  -2.9597e-02  -2.8850e-02
-9.6516e-02   1.4987e-01  -3.8061e-02  -2.9155e-02  -2.8718e-02  -2.8274e-02  -2.7821e-02  -2.7359e-02
-9.7477e-02   1.4558e-01  -2.1917e-02  -2.6551e-02  -2.6416e-02  -2.6264e-02  -2.6093e-02  -2.5905e-02
-9.8455e-02   1.4118e-01  -6.5548e-03  -2.4037e-02  -2.4191e-02  -2.4317e-02  -2.4415e-02  -2.4486e-02
-9.9448e-02   1.3667e-01   8.0274e-03  -2.1615e-02  -2.2042e-02  -2.2432e-02  -2.2786e-02  -2.3104e-02
-1.0046e-01   1.3205e-01   2.1829e-02  -1.9284e-02  -1.9969e-02  -2.0610e-02  -2.1206e-02  -2.1757e-02
-1.0148e-01   1.2732e-01   3.4850e-02  -1.7044e-02  -1.7973e-02  -1.8850e-02  -1.9675e-02  -2.0447e-02
-1.0253e-01   1.2248e-01   4.7091e-02  -1.4895e-02  -1.6054e-02  -1.7153e-02  -1.8193e-02  -1.9174e-02
-1.0359e-01   1.1753e-01   5.8552e-02  -1.2837e-02  -1.4211e-02  -1.5518e-02  -1.6760e-02  -1.7936e-02
-1.0466e-01   1.1248e-01   6.9232e-02  -1.0871e-02  -1.2444e-02  -1.3946e-02  -1.5376e-02  -1.6734e-02
-1.0575e-01   1.0731e-01   7.9131e-02  -8.9946e-03  -1.0754e-02  -1.2437e-02  -1.4042e-02  -1.5569e-02
-1.0686e-01   1.0204e-01   8.8250e-02  -7.2098e-03  -9.1409e-03  -1.0990e-02  -1.2756e-02  -1.4440e-02
-1.0798e-01   9.6655e-02   9.6589e-02  -5.5160e-03  -7.6040e-03  -9.6052e-03  -1.1520e-02  -1.3347e-02
-1.0912e-01   9.1162e-02   1.0415e-01  -3.9132e-03  -6.1436e-03  -8.2833e-03  -1.0332e-02  -1.2290e-02
-1.1028e-01   8.5561e-02   1.1092e-01  -2.4015e-03  -4.7597e-03  -7.0239e-03  -9.1939e-03  -1.1270e-02
-1.1145e-01   7.9850e-02   1.1692e-01  -9.8078e-04  -3.4523e-03  -5.8270e-03  -8.1047e-03  -1.0286e-02
-1.1264e-01   7.4030e-02   1.2214e-01   3.4890e-04  -2.2215e-03  -4.6926e-03  -7.0646e-03  -9.3374e-03
-1.1384e-01   6.8101e-02   1.2658e-01   1.5875e-03  -1.0671e-03  -3.6208e-03  -6.0736e-03  -8.4254e-03
-1.1506e-01   6.2062e-02   1.3023e-01   2.7351e-03   1.0729e-05  -2.6115e-03  -5.1316e-03  -7.5496e-03
-1.1630e-01   5.5915e-02   1.3311e-01   3.7917e-03   1.0121e-03  -1.6648e-03  -4.2388e-03  -6.7099e-03
-1.1755e-01   4.9658e-02   1.3520e-01   4.7573e-03   1.9369e-03  -7.8056e-04  -3.3950e-03  -5.9065e-03
-1.1882e-01   4.3292e-02   1.3652e-01   5.6318e-03   2.7852e-03   4.1125e-05  -2.6003e-03  -5.1392e-03
-1.2011e-01   3.6818e-02   1.3705e-01   6.4153e-03   3.5569e-03   8.0028e-04  -1.8548e-03  -4.4081e-03
-1.2141e-01   3.0234e-02   1.3680e-01   7.1077e-03   4.2522e-03   1.4969e-03  -1.1583e-03  -3.7132e-03
-1.2272e-01   2.3540e-02   1.3578e-01   7.7091e-03   4.8710e-03   2.1310e-03  -5.1086e-04  -3.0545e-03
-1.2406e-01   1.6738e-02   1.3397e-01   8.2195e-03   5.4132e-03   2.7025e-03   8.7458e-05  -2.4320e-03
-1.2541e-01   9.8265e-03   1.3138e-01   8.6389e-03   5.8789e-03   3.2116e-03   6.3668e-04  -1.8457e-03
-1.2677e-01   2.8059e-03   1.2801e-01   8.9672e-03   6.2682e-03   3.6580e-03   1.1368e-03  -1.2955e-03
-1.2816e-01  -4.3238e-03   1.2387e-01   9.2045e-03   6.5809e-03   4.0420e-03   1.5879e-03  -7.8154e-04
-1.2956e-01  -1.1563e-02   1.1894e-01   9.3507e-03   6.8170e-03   4.3634e-03   1.9898e-03  -3.0376e-04
```

-1.3097e-01	-1.8911e-02	1.1323e-01	9.4059e-03	6.9767e-03	4.6223e-03	2.3427e-03	1.3785e-04
-1.3240e-01	-2.6368e-02	1.0674e-01	9.3701e-03	7.0599e-03	4.8187e-03	2.6465e-03	5.4327e-04
-1.3385e-01	-3.3934e-02	9.9468e-02	9.2433e-03	7.0665e-03	4.9525e-03	2.9011e-03	9.1250e-04
-1.3531e-01	-4.1610e-02	9.1417e-02	9.0254e-03	6.9967e-03	5.0238e-03	3.1067e-03	1.2456e-03
-1.3679e-01	-4.9394e-02	8.2586e-02	8.7165e-03	6.8503e-03	5.0325e-03	3.2632e-03	1.5424e-03
-1.3829e-01	-5.7288e-02	7.2974e-02	8.3166e-03	6.6274e-03	4.9787e-03	3.3707e-03	1.8031e-03
-1.3980e-01	-6.5291e-02	6.2582e-02	7.8256e-03	6.3280e-03	4.8624e-03	3.4290e-03	2.0276e-03
-1.4133e-01	-7.3403e-02	5.1410e-02	7.2436e-03	5.9520e-03	4.6836e-03	3.4382e-03	2.2159e-03
-1.4287e-01	-8.1624e-02	3.9457e-02	6.5705e-03	5.4996e-03	4.4422e-03	3.3984e-03	2.3681e-03
-1.4443e-01	-8.9955e-02	2.6723e-02	5.8065e-03	4.9707e-03	4.1383e-03	3.3094e-03	2.4840e-03
-1.4601e-01	-9.8394e-02	1.3209e-02	4.9514e-03	4.3652e-03	3.7719e-03	3.1714e-03	2.5638e-03
-1.4760e-01	-1.0694e-01	-1.0850e-03	4.0052e-03	3.6832e-03	3.3429e-03	2.9843e-03	2.6073e-03
-1.4921e-01	-1.1560e-01	-1.6160e-02	2.9680e-03	2.9247e-03	2.8514e-03	2.7481e-03	2.6147e-03
-1.5084e-01	-1.2437e-01	-3.2015e-02	1.8398e-03	2.0897e-03	2.2973e-03	2.4628e-03	2.5859e-03
-1.5248e-01	-1.3324e-01	-4.8650e-02	6.2061e-04	1.1782e-03	1.6808e-03	2.1284e-03	2.5210e-03
-1.5414e-01	-1.4223e-01	-6.6067e-02	-6.8965e-04	1.9015e-04	1.0017e-03	1.7449e-03	2.4198e-03
-1.5581e-01	-1.5132e-01	-8.4263e-02	-2.0910e-03	-8.7440e-04	2.6002e-04	1.3123e-03	2.2825e-03
-1.5750e-01	-1.6053e-01	-1.0324e-01	-3.5833e-03	-2.0155e-03	-5.4415e-04	8.3065e-04	2.1089e-03
-1.5921e-01	-1.6984e-01	-1.2300e-01	-5.1666e-03	-3.2330e-03	-1.4109e-03	2.9990e-04	1.8992e-03
-1.6093e-01	-1.7926e-01	-1.4354e-01	-6.8410e-03	-4.5271e-03	-2.3401e-03	-2.7994e-04	1.6533e-03
-1.6267e-01	-1.8879e-01	-1.6485e-01	-8.6065e-03	-5.8977e-03	-3.3319e-03	-9.0887e-04	1.3713e-03
-1.6443e-01	-1.9843e-01	-1.8695e-01	-1.0463e-02	-7.3449e-03	-4.3862e-03	-1.5869e-03	1.0530e-03
-1.6620e-01	-2.0818e-01	-2.0983e-01	-1.2410e-02	-8.8685e-03	-5.5030e-03	-2.3140e-03	6.9855e-04
-1.6799e-01	-2.1804e-01	-2.3349e-01	-1.4449e-02	-1.0469e-02	-6.6824e-03	-3.0902e-03	3.0792e-04

Columns 9 through 16:

-1.3792e-01	-1.3551e-01	-1.3319e-01	-1.3096e-01	-1.2881e-01	-1.2675e-01	-1.2478e-01	-1.2289e-01
-1.5162e-01	-1.4421e-01	-1.3683e-01	-1.2948e-01	-1.2217e-01	-1.1489e-01	-1.0765e-01	-1.0044e-01
-7.0335e-02	-5.1667e-02	-3.3800e-02	-1.6735e-02	-4.7178e-04	1.4990e-02	2.9651e-02	4.3510e-02
-3.8689e-02	-3.5401e-02	-3.2218e-02	-2.9139e-02	-2.6164e-02	-2.3293e-02	-2.0526e-02	-1.7864e-02
-3.7283e-02	-3.4355e-02	-3.1516e-02	-2.8767e-02	-2.6108e-02	-2.3537e-02	-2.1057e-02	-1.8666e-02
-3.5900e-02	-3.3320e-02	-3.0815e-02	-2.8385e-02	-2.6031e-02	-2.3752e-02	-2.1548e-02	-1.9420e-02
-3.4541e-02	-3.2297e-02	-3.0114e-02	-2.7993e-02	-2.5934e-02	-2.3936e-02	-2.2001e-02	-2.0127e-02
-3.3207e-02	-3.1286e-02	-2.9414e-02	-2.7591e-02	-2.5817e-02	-2.4091e-02	-2.2414e-02	-2.0786e-02
9.6810e-01	-3.0287e-02	-2.8715e-02	-2.7179e-02	-2.5679e-02	-2.4216e-02	-2.2788e-02	-2.1397e-02
-3.0608e-02	9.7070e-01	-2.8016e-02	-2.6757e-02	-2.5521e-02	-2.4310e-02	-2.3123e-02	-2.1961e-02
-2.9345e-02	-2.8325e-02	9.7268e-01	-2.6324e-02	-2.5343e-02	-2.4375e-02	-2.3419e-02	-2.2477e-02
-2.8105e-02	-2.7362e-02	-2.6621e-02	9.7412e-01	-2.5145e-02	-2.4410e-02	-2.3676e-02	-2.2945e-02
-2.6890e-02	-2.6411e-02	-2.5925e-02	-2.5430e-02	9.7507e-01	-2.4414e-02	-2.3894e-02	-2.3365e-02
-2.5698e-02	-2.5472e-02	-2.5229e-02	-2.4967e-02	-2.4687e-02	9.7561e-01	-2.4073e-02	-2.3738e-02
-2.4529e-02	-2.4545e-02	-2.4534e-02	-2.4495e-02	-2.4428e-02	-2.4334e-02	9.7579e-01	-2.4063e-02
-2.3385e-02	-2.3630e-02	-2.3839e-02	-2.4012e-02	-2.4149e-02	-2.4249e-02	-2.4313e-02	9.7566e-01
-2.2265e-02	-2.2727e-02	-2.3146e-02	-2.3520e-02	-2.3849e-02	-2.4134e-02	-2.4374e-02	-2.4570e-02
-2.1168e-02	-2.1836e-02	-2.2453e-02	-2.3017e-02	-2.3529e-02	-2.3989e-02	-2.4397e-02	-2.4752e-02
-2.0095e-02	-2.0957e-02	-2.1760e-02	-2.2504e-02	-2.3189e-02	-2.3814e-02	-2.4380e-02	-2.4887e-02
-1.9046e-02	-2.0090e-02	-2.1069e-02	-2.1981e-02	-2.2828e-02	-2.3609e-02	-2.4324e-02	-2.4973e-02
-1.8021e-02	-1.9235e-02	-2.0378e-02	-2.1448e-02	-2.2447e-02	-2.3374e-02	-2.4229e-02	-2.5012e-02
-1.7019e-02	-1.8392e-02	-1.9687e-02	-2.0905e-02	-2.2046e-02	-2.3109e-02	-2.4095e-02	-2.5003e-02
-1.6042e-02	-1.7561e-02	-1.8998e-02	-2.0352e-02	-2.1625e-02	-2.2814e-02	-2.3922e-02	-2.4947e-02
-1.5088e-02	-1.6742e-02	-1.8309e-02	-1.9789e-02	-2.1183e-02	-2.2490e-02	-2.3709e-02	-2.4842e-02
-1.4158e-02	-1.5935e-02	-1.7621e-02	-1.9216e-02	-2.0721e-02	-2.2135e-02	-2.3458e-02	-2.4690e-02
-1.3252e-02	-1.5140e-02	-1.6933e-02	-1.8633e-02	-2.0239e-02	-2.1750e-02	-2.3167e-02	-2.4491e-02
-1.2369e-02	-1.4356e-02	-1.6247e-02	-1.8040e-02	-1.9736e-02	-2.1335e-02	-2.2838e-02	-2.4243e-02
-1.1511e-02	-1.3585e-02	-1.5560e-02	-1.7436e-02	-1.9213e-02	-2.0891e-02	-2.2469e-02	-2.3948e-02
-1.0676e-02	-1.2826e-02	-1.4875e-02	-1.6823e-02	-1.8670e-02	-2.0416e-02	-2.2061e-02	-2.3606e-02
-9.8653e-03	-1.2079e-02	-1.4190e-02	-1.6200e-02	-1.8107e-02	-1.9912e-02	-2.1614e-02	-2.3215e-02
-9.0782e-03	-1.1344e-02	-1.3506e-02	-1.5566e-02	-1.7523e-02	-1.9377e-02	-2.1128e-02	-2.2777e-02
-8.3150e-03	-1.0620e-02	-1.2823e-02	-1.4923e-02	-1.6919e-02	-1.8813e-02	-2.0603e-02	-2.2291e-02
-7.5755e-03	-9.9092e-03	-1.2140e-02	-1.4269e-02	-1.6295e-02	-1.8218e-02	-2.0039e-02	-2.1757e-02
-6.8599e-03	-9.2100e-03	-1.1458e-02	-1.3605e-02	-1.5650e-02	-1.7594e-02	-1.9436e-02	-2.1176e-02
-6.1681e-03	-8.5227e-03	-1.0777e-02	-1.2932e-02	-1.4986e-02	-1.6940e-02	-1.8793e-02	-2.0547e-02
-5.5001e-03	-7.8474e-03	-1.0097e-02	-1.2248e-02	-1.4301e-02	-1.6255e-02	-1.8112e-02	-1.9870e-02
-4.8559e-03	-7.1841e-03	-9.4168e-03	-1.1554e-02	-1.3595e-02	-1.5541e-02	-1.7391e-02	-1.9146e-02
-4.2355e-03	-6.5328e-03	-8.7376e-03	-1.0850e-02	-1.2870e-02	-1.4797e-02	-1.6632e-02	-1.8374e-02
-3.6390e-03	-5.8935e-03	-8.0591e-03	-1.0136e-02	-1.2124e-02	-1.4023e-02	-1.5833e-02	-1.7554e-02
-3.0662e-03	-5.2662e-03	-7.3814e-03	-9.4118e-03	-1.1358e-02	-1.3219e-02	-1.4995e-02	-1.6686e-02
-2.5173e-03	-4.6508e-03	-6.7043e-03	-8.6777e-03	-1.0571e-02	-1.2384e-02	-1.4118e-02	-1.5771e-02
-1.9922e-03	-4.0474e-03	-6.0279e-03	-7.9335e-03	-9.7644e-03	-1.1520e-02	-1.3202e-02	-1.4808e-02
-1.4909e-03	-3.4560e-03	-5.3522e-03	-7.1793e-03	-8.9374e-03	-1.0626e-02	-1.2246e-02	-1.3798e-02
-1.0134e-03	-2.8766e-03	-4.6772e-03	-6.4150e-03	-8.0901e-03	-9.7025e-03	-1.1252e-02	-1.2739e-02
-5.5977e-04	-2.3092e-03	-4.0029e-03	-5.6406e-03	-7.2225e-03	-8.7486e-03	-1.0219e-02	-1.1633e-02
-1.2993e-04	-1.7538e-03	-3.3292e-03	-4.8562e-03	-6.3347e-03	-7.7647e-03	-9.1462e-03	-1.0479e-02
2.7610e-04	-1.2104e-03	-2.6563e-03	-4.0617e-03	-5.4265e-03	-6.7508e-03	-8.0346e-03	-9.2778e-03
6.5830e-04	-6.7892e-04	-1.9841e-03	-3.2571e-03	-4.4981e-03	-5.7070e-03	-6.8839e-03	-8.0287e-03
1.0167e-03	-1.5945e-04	-1.3125e-03	-2.4425e-03	-3.5494e-03	-4.6333e-03	-5.6941e-03	-6.7318e-03
1.3513e-03	3.4803e-04	-6.4168e-04	-1.6178e-03	-2.5805e-03	-3.5296e-03	-4.4651e-03	-5.3872e-03
1.6620e-03	8.4353e-04	2.8478e-05	-7.8311e-04	-1.5912e-03	-2.3959e-03	-3.1971e-03	-3.9949e-03
1.9490e-03	1.3270e-03	6.9794e-04	6.1691e-05	-5.8171e-04	-1.2323e-03	-1.8900e-03	-2.5549e-03
2.2121e-03	1.7986e-03	1.3667e-03	9.1655e-04	4.4809e-04	-3.8681e-05	-5.4376e-04	-1.0671e-03
2.4514e-03	2.2581e-03	2.0348e-03	1.7815e-03	1.4982e-03	1.1849e-03	8.4157e-04	4.6828e-04
2.6669e-03	2.7057e-03	2.7022e-03	2.6565e-03	2.5685e-03	2.4384e-03	2.2660e-03	2.0514e-03
2.8586e-03	3.1412e-03	3.3689e-03	3.5415e-03	3.6592e-03	3.7218e-03	3.7295e-03	3.6822e-03
3.0265e-03	3.5648e-03	4.0349e-03	4.4366e-03	4.7701e-03	5.0353e-03	5.2322e-03	5.3608e-03
3.1705e-03	3.9764e-03	4.7002e-03	5.3418e-03	5.9013e-03	6.3787e-03	6.7739e-03	7.0870e-03
3.2907e-03	4.3760e-03	5.3648e-03	6.2570e-03	7.0528e-03	7.7520e-03	8.3547e-03	8.8609e-03
3.3871e-03	4.7636e-03	6.0287e-03	7.1823e-03	8.2245e-03	9.1553e-03	9.9747e-03	1.0683e-02
3.4597e-03	5.1393e-03	6.6919e-03	8.1177e-03	9.4166e-03	1.0589e-02	1.1634e-02	1.2552e-02
3.5085e-03	5.5029e-03	7.3544e-03	9.0631e-03	1.0629e-02	1.2052e-02	1.3332e-02	1.4469e-02
3.5335e-03	5.8546e-03	8.0163e-03	1.0019e-02	1.1861e-02	1.3545e-02	1.5069e-02	1.6434e-02
3.5346e-03	6.1943e-03	8.6774e-03	1.0984e-02	1.3114e-02	1.5068e-02	1.6845e-02	1.8446e-02
3.5120e-03	6.5220e-03	9.3379e-03	1.1960e-02	1.4387e-02	1.6621e-02	1.8661e-02	2.0506e-02

Columns 17 through 24:

-1.2109e-01	-1.1938e-01	-1.1776e-01	-1.1622e-01	-1.1477e-01	-1.1341e-01	-1.1214e-01	-1.1095e-01
-9.3262e-02	-8.6120e-02	-7.9013e-02	-7.1939e-02	-6.4899e-02	-5.7894e-02	-5.0922e-02	-4.3984e-02
5.6568e-02	6.8824e-02	8.0279e-02	9.0933e-02	1.0078e-01	1.0984e-01	1.1808e-01	1.2553e-01
-1.5305e-02	-1.2851e-02	-1.0500e-02	-8.2543e-03	-6.1123e-03	-4.0745e-03	-2.1408e-03	-3.1120e-04
-1.6364e-02	-1.4152e-02	-1.2029e-02	-9.9960e-03	-8.0523e-03	-6.1980e-03	-4.4333e-03	-2.7580e-03
-1.7367e-02	-1.5390e-02	-1.3488e-02	-1.1661e-02	-9.9096e-03	-8.2335e-03	-6.6329e-03	-5.1076e-03
-1.8315e-02	-1.6564e-02	-1.4876e-02	-1.3249e-02	-1.1684e-02	-1.0181e-02	-8.7396e-03	-7.3600e-03
-1.9206e-02	-1.7676e-02	-1.6194e-02	-1.4761e-02	-1.3376e-02	-1.2040e-02	-1.0753e-02	-9.5152e-03
-2.0042e-02	-1.8724e-02	-1.7441e-02	-1.6195e-02	-1.4985e-02	-1.3812e-02	-1.2674e-02	-1.1573e-02
-2.0823e-02	-1.9709e-02	-1.8619e-02	-1.7553e-02	-1.6512e-02	-1.5495e-02	-1.4502e-02	-1.3534e-02

-2.1547e-02 -2.0630e-02 -1.9726e-02 -1.8835e-02 -1.7956e-02 -1.7090e-02 -1.6238e-02 -1.5398e-02
-2.2216e-02 -2.1488e-02 -2.0763e-02 -2.0039e-02 -1.9317e-02 -1.8598e-02 -1.7880e-02 -1.7164e-02
-2.2828e-02 -2.2283e-02 -2.1729e-02 -2.1167e-02 -2.0596e-02 -2.0017e-02 -1.9429e-02 -1.8834e-02
-2.3385e-02 -2.3014e-02 -2.2625e-02 -2.2218e-02 -2.1792e-02 -2.1348e-02 -2.0886e-02 -2.0406e-02
-2.3887e-02 -2.3683e-02 -2.3451e-02 -2.3192e-02 -2.2905e-02 -2.2591e-02 -2.2250e-02 -2.1881e-02
-2.4332e-02 -2.4288e-02 -2.4207e-02 -2.4089e-02 -2.3936e-02 -2.3746e-02 -2.3520e-02 -2.3258e-02
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-2.5557e-02 -2.6074e-02 -2.6526e-02 9.7309e-01 -2.7232e-02 -2.7486e-02 -2.7675e-02 -2.7797e-02
-2.5723e-02 -2.6363e-02 -2.6930e-02 -2.7426e-02 9.7215e-01 -2.8201e-02 -2.8481e-02 -2.8689e-02
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-1.4163e-02 -1.5525e-02 -1.6824e-02 -1.8060e-02 -1.9234e-02 -2.0344e-02 -2.1392e-02 -2.2378e-02
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-6.2957e-03 -7.1906e-03 -8.0720e-03 -8.9399e-03 -9.7942e-03 -1.0635e-02 -1.1462e-02 -1.2276e-02
-4.7892e-03 -5.5800e-03 -6.3674e-03 -7.1513e-03 -7.9317e-03 -8.7087e-03 -9.4822e-03 -1.0252e-02
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1.7946e-03 1.4955e-03 1.1543e-03 7.7076e-04 3.4504e-04 -1.2290e-04 -6.3307e-04 -1.1855e-03
3.5799e-03 3.4227e-03 3.2104e-03 2.9431e-03 2.6209e-03 2.2436e-03 1.8114e-03 1.3242e-03
5.4211e-03 5.4131e-03 5.3368e-03 5.1922e-03 4.9794e-03 4.6982e-03 4.3488e-03 3.9311e-03
7.3180e-03 7.4668e-03 7.5335e-03 7.5181e-03 7.4206e-03 7.2409e-03 6.9791e-03 6.6351e-03
9.2707e-03 9.5839e-03 9.8005e-03 9.9207e-03 9.9444e-03 9.8716e-03 9.7022e-03 9.4364e-03
1.1279e-02 1.1764e-02 1.2138e-02 1.2400e-02 1.2551e-02 1.2590e-02 1.2518e-02 1.2335e-02
1.3343e-02 1.4008e-02 1.4545e-02 1.4956e-02 1.5240e-02 1.5397e-02 1.5427e-02 1.5330e-02
1.5463e-02 1.6315e-02 1.7023e-02 1.7589e-02 1.8012e-02 1.8292e-02 1.8429e-02 1.8423e-02
1.7639e-02 1.8685e-02 1.9572e-02 2.0299e-02 2.0866e-02 2.1275e-02 2.1524e-02 2.1613e-02
1.9871e-02 2.1119e-02 2.2190e-02 2.3085e-02 2.3804e-02 2.4346e-02 2.4711e-02 2.4900e-02
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Columns 25 through 32:

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-3.7081e-02 -3.0211e-02 -2.3376e-02 -1.6575e-02 -9.8073e-03 -3.0739e-03 3.6253e-03 1.0291e-02
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1.4142e-03 3.0355e-03 4.5527e-03 5.9658e-03 7.2747e-03 8.4794e-03 9.5801e-03 1.0577e-02
-1.1722e-03 3.2416e-04 1.7310e-03 3.0484e-03 4.2763e-03 5.4147e-03 6.4636e-03 7.4231e-03
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3.4451e-03 2.8907e-03 2.2681e-03 1.5772e-03 8.1805e-04 -9.4259e-06 -9.0520e-04 -1.8693e-03
6.2090e-03 5.7008e-03 5.1105e-03 4.4380e-03 3.6834e-03 2.8467e-03 1.9278e-03 9.2682e-04
9.0740e-03 8.6151e-03 8.0597e-03 7.4078e-03 6.6594e-03 5.8145e-03 4.8731e-03 3.8352e-03
1.2040e-02 1.1634e-02 1.1116e-02 1.0487e-02 9.7461e-03 8.8940e-03 7.9306e-03 6.8557e-03
1.5107e-02 1.4756e-02 1.4279e-02 1.3675e-02 1.2943e-02 1.2085e-02 1.1100e-02 9.9886e-03
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2.1543e-02 2.1314e-02 2.0925e-02 2.0377e-02 1.9670e-02 1.8803e-02 1.7777e-02 1.6591e-02
2.4913e-02 2.4749e-02 2.4409e-02 2.3892e-02 2.3199e-02 2.2329e-02 2.1283e-02 2.0061e-02
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Columns 33 through 40:

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8.2930e-03 9.0735e-03 9.7646e-03 1.0366e-02 1.0878e-02 1.1301e-02 1.1634e-02 1.1877e-02
5.2289e-03 6.0006e-03 6.6969e-03 7.3179e-03 7.8635e-03 8.3337e-03 8.7286e-03 9.0481e-03
2.2765e-03 3.0383e-03 3.7383e-03 4.3766e-03 4.9530e-03 5.4677e-03 5.9206e-03 6.3117e-03
-5.6422e-04 1.8663e-04 8.8874e-04 1.5421e-03 2.1468e-03 2.7026e-03 3.2098e-03 3.6682e-03
-3.2932e-03 -2.5544e-03 -1.8518e-03 -1.1854e-03 -5.5531e-04 3.8573e-05 5.9622e-04 1.1176e-03
-5.9105e-03 -5.1847e-03 -4.4833e-03 -3.8061e-03 -3.1532e-03 -2.5245e-03 -1.9201e-03 -1.3400e-03
-8.4160e-03 -7.7045e-03 -7.0057e-03 -6.3199e-03 -5.6468e-03 -4.9866e-03 -4.3393e-03 -3.7048e-03
-1.0810e-02 -1.0114e-02 -9.4192e-03 -8.7268e-03 -8.0363e-03 -7.3478e-03 -6.6612e-03 -5.9766e-03
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Columns 41 through 48:

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Columns 49 through 56:

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1.0043e-02 9.3922e-03 8.6516e-03 7.8215e-03 6.9018e-03 5.8927e-03 4.7942e-03 3.6061e-03
8.5325e-03 8.0984e-03 7.5889e-03 7.0041e-03 6.3439e-03 5.6083e-03 4.7974e-03 3.9111e-03
7.0515e-03 6.8248e-03 6.5363e-03 6.1861e-03 5.7740e-03 5.3002e-03 4.7646e-03 4.1672e-03
5.6006e-03 5.5717e-03 5.4939e-03 5.3675e-03 5.1923e-03 4.9683e-03 4.6956e-03 4.3742e-03
4.1798e-03 4.3388e-03 4.4617e-03 4.5483e-03 4.5986e-03 4.6127e-03 4.5906e-03 4.5323e-03
2.7889e-03 3.1264e-03 3.4395e-03 3.7284e-03 3.9931e-03 4.2334e-03 4.4495e-03 4.6413e-03
1.4281e-03 1.9343e-03 2.4276e-03 2.9080e-03 3.3756e-03 3.8304e-03 4.2723e-03 4.7014e-03
9.7363e-05 7.6251e-04 1.4257e-03 2.0870e-03 2.7463e-03 3.4036e-03 4.0590e-03 4.7125e-03
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-2.2832e-02 -2.1253e-02 -1.9576e-02 -1.7801e-02 -1.5928e-02 -1.3956e-02 -1.1887e-02 -9.7187e-03
-2.3412e-02 -2.1916e-02 -2.0325e-02 -1.8637e-02 -1.6855e-02 -1.4976e-02 -1.3002e-02 -1.0932e-02
-2.3962e-02 -2.2559e-02 -2.1063e-02 -1.9474e-02 -1.7793e-02 -1.6020e-02 -1.4154e-02 -1.2195e-02
-2.4482e-02 -2.3181e-02 -2.1791e-02 -2.0312e-02 -1.8744e-02 -1.7087e-02 -1.5341e-02 -1.3507e-02
-2.4972e-02 -2.3783e-02 -2.2509e-02 -2.1150e-02 -1.9706e-02 -1.8178e-02 -1.6565e-02 -1.4867e-02
-2.5432e-02 -2.4364e-02 -2.3217e-02 -2.1989e-02 -2.0681e-02 -1.9293e-02 -1.7825e-02 -1.6277e-02
-2.5862e-02 -2.4926e-02 -2.3914e-02 -2.2828e-02 -2.1667e-02 -2.0431e-02 -1.9121e-02 -1.7736e-02
-2.6262e-02 -2.5466e-02 -2.4602e-02 -2.3668e-02 -2.2665e-02 -2.1594e-02 -2.0453e-02 -1.9243e-02
-2.6632e-02 -2.5987e-02 -2.5279e-02 -2.4509e-02 -2.3676e-02 -2.2780e-02 -2.1821e-02 -2.0800e-02
-2.6972e-02 -2.6487e-02 -2.5946e-02 -2.5350e-02 -2.4698e-02 -2.3989e-02 -2.3225e-02 -2.2406e-02
-2.7281e-02 -2.6967e-02 -2.6603e-02 -2.6192e-02 -2.5731e-02 -2.5223e-02 -2.4666e-02 -2.4060e-02
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9.7197e-01 -2.8284e-02 -2.8514e-02 -2.8721e-02 -2.8905e-02 -2.9065e-02 -2.9203e-02 -2.9318e-02
-2.8220e-02 9.7132e-01 -2.9130e-02 -2.9565e-02 -2.9986e-02 -3.0394e-02 -3.0788e-02 -3.1168e-02
-2.8380e-02 -2.9060e-02 9.7026e-01 -3.0410e-02 -3.1080e-02 -3.1746e-02 -3.2409e-02 -3.3068e-02
-2.8509e-02 -2.9417e-02 -3.0333e-02 9.6874e-01 -3.2185e-02 -3.3122e-02 -3.4065e-02 -3.5017e-02
-2.8609e-02 -2.9755e-02 -3.0919e-02 -3.2101e-02 9.6670e-01 -3.4521e-02 -3.5758e-02 -3.7014e-02

-2.8678e-02 -3.0072e-02 -3.1495e-02 -3.2948e-02 -3.4431e-02 9.6406e-01 -3.7487e-02 -3.9061e-02
-2.8718e-02 -3.0368e-02 -3.2061e-02 -3.3795e-02 -3.5572e-02 -3.7391e-02 9.6075e-01 -4.1156e-02
-2.8727e-02 -3.0644e-02 -3.2616e-02 -3.4643e-02 -3.6725e-02 -3.8862e-02 -4.1054e-02 9.5670e-01
-2.8707e-02 -3.0900e-02 -3.3162e-02 -3.5492e-02 -3.7890e-02 -4.0356e-02 -4.2891e-02 -4.5494e-02
-2.8656e-02 -3.1136e-02 -3.3697e-02 -3.6341e-02 -3.9067e-02 -4.1874e-02 -4.4764e-02 -4.7737e-02
-2.8576e-02 -3.1351e-02 -3.4222e-02 -3.7190e-02 -4.0255e-02 -4.3416e-02 -4.6674e-02 -5.0028e-02
-2.8465e-02 -3.1546e-02 -3.4737e-02 -3.8041e-02 -4.1456e-02 -4.4982e-02 -4.8619e-02 -5.2369e-02
-2.8324e-02 -3.1720e-02 -3.5242e-02 -3.8892e-02 -4.2668e-02 -4.6571e-02 -5.0601e-02 -5.4758e-02
-2.8154e-02 -3.1874e-02 -3.5737e-02 -3.9743e-02 -4.3892e-02 -4.8184e-02 -5.2619e-02 -5.7196e-02
-2.7953e-02 -3.2008e-02 -3.6222e-02 -4.0595e-02 -4.5128e-02 -4.9821e-02 -5.4673e-02 -5.9684e-02
-2.7722e-02 -3.2121e-02 -3.6696e-02 -4.1448e-02 -4.6377e-02 -5.1481e-02 -5.6763e-02 -6.2220e-02
-2.7461e-02 -3.2214e-02 -3.7161e-02 -4.2302e-02 -4.7637e-02 -5.3166e-02 -5.8889e-02 -6.4806e-02

Columns 57 through 64:

-1.2068e-01 -1.2246e-01 -1.2432e-01 -1.2627e-01 -1.2831e-01 -1.3044e-01 -1.3265e-01 -1.3495e-01
1.6586e-01 1.7164e-01 1.7738e-01 1.8310e-01 1.8877e-01 1.9442e-01 2.0003e-01 2.0560e-01
-7.8306e-02 -9.8107e-02 -1.1871e-01 -1.4011e-01 -1.6232e-01 -1.8533e-01 -2.0914e-01 -2.3375e-01
1.6452e-03 -6.5776e-05 -1.8809e-03 -3.8002e-03 -5.8236e-03 -7.9511e-03 -1.0183e-02 -1.2519e-02
2.3286e-03 9.6157e-04 -4.9493e-04 -2.0409e-03 -3.6763e-03 -5.4013e-03 -7.2157e-03 -9.1196e-03
2.9495e-03 1.9125e-03 8.0014e-04 -3.8758e-04 -1.6507e-03 -2.9891e-03 -4.4029e-03 -5.8921e-03
3.5080e-03 2.7870e-03 2.0043e-03 1.1598e-03 2.5345e-04 -7.1464e-04 -1.7445e-03 -2.8362e-03
4.0041e-03 3.5852e-03 3.1175e-03 2.6011e-03 2.0360e-03 1.4221e-03 7.5955e-04 4.8204e-05
4.4377e-03 4.3069e-03 4.1398e-03 3.9365e-03 3.6970e-03 3.4212e-03 3.1092e-03 2.7610e-03
4.8089e-03 4.9522e-03 5.0712e-03 5.1659e-03 5.2364e-03 5.2826e-03 5.3046e-03 5.3023e-03
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5.5479e-03 6.4297e-03 7.3198e-03 8.2184e-03 9.1253e-03 1.0041e-02 1.0964e-02 1.1897e-02
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5.6593e-03 7.3300e-03 9.0451e-03 1.0805e-02 1.2609e-02 1.4457e-02 1.6350e-02 1.8287e-02
5.5310e-03 7.3640e-03 9.2491e-03 1.1186e-02 1.3176e-02 1.5217e-02 1.7311e-02 1.9456e-02
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3.4506e-03 5.9638e-03 8.5638e-03 1.1251e-02 1.4024e-02 1.6885e-02 1.9832e-02 2.2866e-02
2.8854e-03 5.4630e-03 8.1314e-03 1.0890e-02 1.3740e-02 1.6681e-02 1.9712e-02 2.2834e-02
2.2577e-03 4.8858e-03 7.6080e-03 1.0424e-02 1.3335e-02 1.6339e-02 1.9438e-02 2.2630e-02
1.5676e-03 4.2322e-03 6.9937e-03 9.8522e-03 1.2808e-02 1.5860e-02 1.9009e-02 2.2255e-02
8.1505e-04 3.5022e-03 6.2885e-03 9.1741e-03 1.2159e-02 1.5243e-02 1.8426e-02 2.1708e-02
8.2910e-08 2.6958e-03 5.4924e-03 8.3900e-03 1.1389e-02 1.4488e-02 1.7689e-02 2.0990e-02
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-5.0112e-03 -2.4824e-03 1.4800e-04 2.8801e-03 5.7138e-03 8.6491e-03 1.1686e-02 1.4825e-02
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-3.5975e-02 -3.6940e-02 -3.7913e-02 -3.8892e-02 -3.9879e-02 -4.0873e-02 -4.1874e-02 -4.2883e-02
-3.8288e-02 -3.9580e-02 -4.0891e-02 -4.2220e-02 -4.3567e-02 -4.4932e-02 -4.6316e-02 -4.7718e-02
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9.5183e-01 -5.0905e-02 -5.3713e-02 -5.6589e-02 -5.9534e-02 -6.2547e-02 -6.5628e-02 -6.8777e-02
-5.0791e-02 9.4607e-01 -5.7146e-02 -6.0447e-02 -6.3829e-02 -6.7294e-02 -7.0841e-02 -7.4471e-02
-5.3479e-02 -5.7026e-02 9.3933e-01 -6.4410e-02 -6.8246e-02 -7.2180e-02 -7.6209e-02 -8.0336e-02
-5.6229e-02 -6.0201e-02 -6.4284e-02 9.3152e-01 -7.2785e-02 -7.7203e-02 -8.1732e-02 -8.6372e-02
-5.9042e-02 -6.3452e-02 -6.7990e-02 -7.2654e-02 9.2255e-01 -8.2364e-02 -8.7409e-02 -9.2581e-02
-6.1917e-02 -6.6780e-02 -7.1786e-02 -7.6935e-02 -8.2227e-02 9.1234e-01 -9.3240e-02 -9.8960e-02
-6.4854e-02 -7.0184e-02 -7.5674e-02 -8.1323e-02 -8.7131e-02 -9.3098e-02 9.0077e-01 -1.0551e-01
-6.7854e-02 -7.3665e-02 -7.9652e-02 -8.5816e-02 -9.2156e-02 -9.8672e-02 -1.0537e-01 8.8777e-01
-7.0917e-02 -7.7222e-02 -8.3721e-02 -9.0415e-02 -9.7302e-02 -1.0438e-01 -1.1166e-01 -1.1913e-01

Column 65:

-1.3734e-01
2.1115e-01
-2.5916e-01
-1.4959e-02
-1.1113e-02
-7.4566e-03
-3.9896e-03
-7.1188e-04
2.3765e-03
5.2757e-03
7.9855e-03
1.0506e-02
1.2837e-02
1.4979e-02
1.6932e-02
1.8695e-02
2.0269e-02
2.1654e-02
2.2849e-02
2.3855e-02
2.4672e-02
2.5300e-02

2.5738e-02
2.5987e-02
2.6047e-02
2.5917e-02
2.5598e-02
2.5090e-02
2.4392e-02
2.3505e-02
2.2429e-02
2.1164e-02
1.9709e-02
1.8065e-02
1.6232e-02
1.4209e-02
1.1997e-02
9.5958e-03
7.0053e-03
4.2254e-03
1.2563e-03
-1.9022e-03
-5.2499e-03
-8.7869e-03
-1.2513e-02
-1.6429e-02
-2.0534e-02
-2.4828e-02
-2.9312e-02
-3.3984e-02
-3.8847e-02
-4.3898e-02
-4.9139e-02
-5.4569e-02
-6.0188e-02
-6.5997e-02
-7.1995e-02
-7.8182e-02
-8.4558e-02
-9.1124e-02
-9.7879e-02
-1.0482e-01
-1.1196e-01
-1.1928e-01
8.7321e-01

Ut =

-0.8223	0.5535	0.1321
-0.4642	-0.5181	-0.7184
-0.3292	-0.6520	0.6830

OSSERVAZIONI

Si nota che, confrontando le matrici A, U e le trasposte At, Ut, si ottengono esattamente gli stessi valori.
Ciò accade in quanto i vettori singolari di sinistra corrispondono alla base ortonormale per il range della matrice di partenza, ottenuto individuando tutte le combinazioni lineari delle colonne della matrice U (e Ut) per cui U*x=b, dove b è un vettore qualsiasi.

---Usando la funzione Matlab “null”, confrontare il nucleo di A (risp. At) con la matrice dei vettori singolari destri di A (risp. At).

Di seguito i risultati ottenuti:

nucleoA =

Empty matrix: 3-by-0

nucleoAt =

Columns 1 through 7

-0.1513	-0.1484	-0.1457	-0.1430	-0.1404	-0.1379	-0.1355
-0.1892	-0.1816	-0.1741	-0.1666	-0.1591	-0.1516	-0.1442
-0.1757	-0.1530	-0.1311	-0.1101	-0.0898	-0.0703	-0.0517
0.9433	-0.0529	-0.0492	-0.0456	-0.0421	-0.0387	-0.0354
-0.0533	0.9501	-0.0466	-0.0434	-0.0403	-0.0373	-0.0344
-0.0499	-0.0470	0.9559	-0.0413	-0.0386	-0.0359	-0.0333
-0.0467	-0.0441	-0.0416	0.9608	-0.0368	-0.0345	-0.0323
-0.0435	-0.0414	-0.0393	-0.0372	0.9648	-0.0332	-0.0313
-0.0405	-0.0387	-0.0369	-0.0352	-0.0335	0.9681	-0.0303
-0.0375	-0.0361	-0.0347	-0.0333	-0.0319	-0.0306	0.9707
-0.0346	-0.0336	-0.0325	-0.0314	-0.0304	-0.0293	-0.0283
-0.0318	-0.0311	-0.0303	-0.0296	-0.0289	-0.0281	-0.0274
-0.0292	-0.0287	-0.0283	-0.0278	-0.0274	-0.0269	-0.0264
-0.0266	-0.0264	-0.0263	-0.0261	-0.0259	-0.0257	-0.0255
-0.0240	-0.0242	-0.0243	-0.0244	-0.0245	-0.0245	-0.0245
-0.0216	-0.0220	-0.0224	-0.0228	-0.0231	-0.0234	-0.0236
-0.0193	-0.0200	-0.0206	-0.0212	-0.0218	-0.0223	-0.0227
-0.0170	-0.0180	-0.0189	-0.0197	-0.0204	-0.0212	-0.0218
-0.0149	-0.0161	-0.0172	-0.0182	-0.0192	-0.0201	-0.0210

-0.0128	-0.0142	-0.0155	-0.0168	-0.0179	-0.0190	-0.0201
-0.0109	-0.0124	-0.0139	-0.0154	-0.0167	-0.0180	-0.0192
-0.0090	-0.0108	-0.0124	-0.0140	-0.0156	-0.0170	-0.0184
-0.0072	-0.0091	-0.0110	-0.0128	-0.0144	-0.0160	-0.0176
-0.0055	-0.0076	-0.0096	-0.0115	-0.0133	-0.0151	-0.0167
-0.0039	-0.0061	-0.0083	-0.0103	-0.0123	-0.0142	-0.0159
-0.0024	-0.0048	-0.0070	-0.0092	-0.0113	-0.0133	-0.0151
-0.0010	-0.0035	-0.0058	-0.0081	-0.0103	-0.0124	-0.0144
0.0003	-0.0022	-0.0047	-0.0071	-0.0093	-0.0115	-0.0136
0.0016	-0.0011	-0.0036	-0.0061	-0.0084	-0.0107	-0.0128
0.0027	0.0000	-0.0026	-0.0051	-0.0075	-0.0099	-0.0121
0.0038	0.0010	-0.0017	-0.0042	-0.0067	-0.0091	-0.0113
0.0048	0.0019	-0.0008	-0.0034	-0.0059	-0.0083	-0.0106
0.0056	0.0028	0.0000	-0.0026	-0.0051	-0.0076	-0.0099
0.0064	0.0036	0.0008	-0.0019	-0.0044	-0.0069	-0.0092
0.0071	0.0043	0.0015	-0.0012	-0.0037	-0.0062	-0.0085
0.0077	0.0049	0.0021	-0.0005	-0.0031	-0.0055	-0.0078
0.0082	0.0054	0.0027	0.0001	-0.0024	-0.0049	-0.0072
0.0086	0.0059	0.0032	0.0006	-0.0018	-0.0042	-0.0065
0.0090	0.0063	0.0037	0.0011	-0.0013	-0.0036	-0.0059
0.0092	0.0066	0.0040	0.0016	-0.0008	-0.0031	-0.0053
0.0094	0.0068	0.0044	0.0020	-0.0003	-0.0025	-0.0047
0.0094	0.0070	0.0046	0.0023	0.0001	-0.0020	-0.0040
0.0094	0.0071	0.0048	0.0026	0.0005	-0.0015	-0.0035
0.0092	0.0071	0.0050	0.0029	0.0009	-0.0010	-0.0029
0.0090	0.0070	0.0050	0.0031	0.0012	-0.0006	-0.0023
0.0087	0.0069	0.0050	0.0033	0.0015	-0.0001	-0.0018
0.0083	0.0066	0.0050	0.0034	0.0018	0.0003	-0.0012
0.0078	0.0063	0.0049	0.0034	0.0020	0.0007	-0.0007
0.0072	0.0060	0.0047	0.0034	0.0022	0.0010	-0.0002
0.0066	0.0055	0.0044	0.0034	0.0024	0.0014	0.0003
0.0058	0.0050	0.0041	0.0033	0.0025	0.0017	0.0008
0.0050	0.0044	0.0038	0.0032	0.0026	0.0019	0.0013
0.0040	0.0037	0.0033	0.0030	0.0026	0.0022	0.0018
0.0030	0.0029	0.0029	0.0027	0.0026	0.0025	0.0023
0.0018	0.0021	0.0023	0.0025	0.0026	0.0027	0.0027
0.0006	0.0012	0.0017	0.0021	0.0025	0.0029	0.0031
-0.0007	0.0002	0.0010	0.0017	0.0024	0.0030	0.0036
-0.0021	-0.0009	0.0003	0.0013	0.0023	0.0032	0.0040
-0.0036	-0.0020	-0.0005	0.0008	0.0021	0.0033	0.0044
-0.0052	-0.0032	-0.0014	0.0003	0.0019	0.0034	0.0048
-0.0068	-0.0045	-0.0023	-0.0003	0.0017	0.0035	0.0051
-0.0086	-0.0059	-0.0033	-0.0009	0.0014	0.0035	0.0055
-0.0105	-0.0073	-0.0044	-0.0016	0.0011	0.0035	0.0059
-0.0124	-0.0089	-0.0055	-0.0023	0.0007	0.0035	0.0062
-0.0144	-0.0105	-0.0067	-0.0031	0.0003	0.0035	0.0065

Columns 8 through 14

-0.1332	-0.1310	-0.1288	-0.1268	-0.1248	-0.1229	-0.1211
-0.1368	-0.1295	-0.1222	-0.1149	-0.1076	-0.1004	-0.0933
-0.0338	-0.0167	-0.0005	0.0150	0.0297	0.0435	0.0566
-0.0322	-0.0291	-0.0262	-0.0233	-0.0205	-0.0179	-0.0153
-0.0315	-0.0288	-0.0261	-0.0235	-0.0211	-0.0187	-0.0164
-0.0308	-0.0284	-0.0260	-0.0238	-0.0215	-0.0194	-0.0174
-0.0301	-0.0280	-0.0259	-0.0239	-0.0220	-0.0201	-0.0183
-0.0294	-0.0276	-0.0258	-0.0241	-0.0224	-0.0208	-0.0192
-0.0287	-0.0272	-0.0257	-0.0242	-0.0228	-0.0214	-0.0200
-0.0280	-0.0268	-0.0255	-0.0243	-0.0231	-0.0220	-0.0208
0.9727	-0.0263	-0.0253	-0.0244	-0.0234	-0.0225	-0.0215
-0.0266	0.9741	-0.0251	-0.0244	-0.0237	-0.0229	-0.0222
-0.0259	-0.0254	0.9751	-0.0244	-0.0239	-0.0234	-0.0228
-0.0252	-0.0250	-0.0247	0.9756	-0.0241	-0.0237	-0.0234
-0.0245	-0.0245	-0.0244	-0.0243	0.9758	-0.0241	-0.0239
-0.0238	-0.0240	-0.0241	-0.0242	-0.0243	0.9757	-0.0243
-0.0231	-0.0235	-0.0238	-0.0241	-0.0244	-0.0246	0.9753
-0.0225	-0.0230	-0.0235	-0.0240	-0.0244	-0.0248	-0.0251
-0.0218	-0.0225	-0.0232	-0.0238	-0.0244	-0.0249	-0.0253
-0.0211	-0.0220	-0.0228	-0.0236	-0.0243	-0.0250	-0.0256
-0.0204	-0.0214	-0.0224	-0.0234	-0.0242	-0.0250	-0.0257
-0.0197	-0.0209	-0.0220	-0.0231	-0.0241	-0.0250	-0.0258
-0.0190	-0.0204	-0.0216	-0.0228	-0.0239	-0.0249	-0.0259
-0.0183	-0.0198	-0.0212	-0.0225	-0.0237	-0.0248	-0.0259
-0.0176	-0.0192	-0.0207	-0.0221	-0.0235	-0.0247	-0.0258
-0.0169	-0.0186	-0.0202	-0.0218	-0.0232	-0.0245	-0.0257
-0.0162	-0.0180	-0.0197	-0.0213	-0.0228	-0.0242	-0.0256
-0.0156	-0.0174	-0.0192	-0.0209	-0.0225	-0.0239	-0.0253
-0.0149	-0.0168	-0.0187	-0.0204	-0.0221	-0.0236	-0.0250
-0.0142	-0.0162	-0.0181	-0.0199	-0.0216	-0.0232	-0.0247
-0.0135	-0.0156	-0.0175	-0.0194	-0.0211	-0.0228	-0.0243
-0.0128	-0.0149	-0.0169	-0.0188	-0.0206	-0.0223	-0.0239
-0.0121	-0.0143	-0.0163	-0.0182	-0.0200	-0.0218	-0.0234
-0.0115	-0.0136	-0.0157	-0.0176	-0.0194	-0.0212	-0.0228
-0.0108	-0.0129	-0.0150	-0.0169	-0.0188	-0.0205	-0.0222
-0.0101	-0.0122	-0.0143	-0.0163	-0.0181	-0.0199	-0.0215
-0.0094	-0.0116	-0.0136	-0.0155	-0.0174	-0.0191	-0.0208
-0.0087	-0.0108	-0.0129	-0.0148	-0.0166	-0.0184	-0.0200
-0.0081	-0.0101	-0.0121	-0.0140	-0.0158	-0.0176	-0.0192
-0.0074	-0.0094	-0.0114	-0.0132	-0.0150	-0.0167	-0.0183
-0.0067	-0.0087	-0.0106	-0.0124	-0.0141	-0.0158	-0.0173
-0.0060	-0.0079	-0.0098	-0.0115	-0.0132	-0.0148	-0.0163
-0.0054	-0.0072	-0.0089	-0.0106	-0.0122	-0.0138	-0.0153
-0.0047	-0.0064	-0.0081	-0.0097	-0.0113	-0.0127	-0.0142
-0.0040	-0.0056	-0.0072	-0.0087	-0.0102	-0.0116	-0.0130
-0.0033	-0.0049	-0.0063	-0.0078	-0.0091	-0.0105	-0.0118
-0.0027	-0.0041	-0.0054	-0.0068	-0.0080	-0.0093	-0.0105
-0.0020	-0.0033	-0.0045	-0.0057	-0.0069	-0.0080	-0.0091
-0.0013	-0.0024	-0.0035	-0.0046	-0.0057	-0.0067	-0.0077
-0.0006	-0.0016	-0.0026	-0.0035	-0.0045	-0.0054	-0.0063
0.0000	-0.0008	-0.0016	-0.0024	-0.0032	-0.0040	-0.0048
0.0007	0.0001	-0.0006	-0.0012	-0.0019	-0.0026	-0.0032
0.0014	0.0009	0.0004	-0.0000	-0.0005	-0.0011	-0.0016
0.0020	0.0018	0.0015	0.0012	0.0008	0.0005	0.0001
0.0027	0.0027	0.0026	0.0024	0.0023	0.0021	0.0018
0.0034	0.0035	0.0037	0.0037	0.0037	0.0037	0.0036

```
   0.0040   0.0044   0.0048   0.0050   0.0052   0.0054   0.0054
   0.0047   0.0053   0.0059   0.0064   0.0068   0.0071   0.0073
   0.0054   0.0063   0.0071   0.0078   0.0084   0.0089   0.0093
   0.0060   0.0072   0.0082   0.0092   0.0100   0.0107   0.0113
   0.0067   0.0081   0.0094   0.0106   0.0116   0.0126   0.0133
   0.0074   0.0091   0.0106   0.0121   0.0133   0.0145   0.0155
   0.0080   0.0100   0.0119   0.0135   0.0151   0.0164   0.0176
   0.0087   0.0110   0.0131   0.0151   0.0168   0.0184   0.0199
   0.0093   0.0120   0.0144   0.0166   0.0187   0.0205   0.0222
```

Columns 15 through 21

```
-0.1194  -0.1178  -0.1162  -0.1148  -0.1134  -0.1121  -0.1109
-0.0861  -0.0790  -0.0719  -0.0649  -0.0579  -0.0509  -0.0440
 0.0688   0.0803   0.0909   0.1008   0.1098   0.1181   0.1255
-0.0129  -0.0105  -0.0083  -0.0061  -0.0041  -0.0021  -0.0003
-0.0142  -0.0120  -0.0100  -0.0081  -0.0062  -0.0044  -0.0028
-0.0154  -0.0135  -0.0117  -0.0099  -0.0082  -0.0066  -0.0051
-0.0166  -0.0149  -0.0132  -0.0117  -0.0102  -0.0087  -0.0074
-0.0177  -0.0162  -0.0148  -0.0134  -0.0120  -0.0108  -0.0095
-0.0187  -0.0174  -0.0162  -0.0150  -0.0138  -0.0127  -0.0116
-0.0197  -0.0186  -0.0176  -0.0165  -0.0155  -0.0145  -0.0135
-0.0206  -0.0197  -0.0188  -0.0180  -0.0171  -0.0162  -0.0154
-0.0215  -0.0208  -0.0200  -0.0193  -0.0186  -0.0179  -0.0172
-0.0223  -0.0217  -0.0212  -0.0206  -0.0200  -0.0194  -0.0188
-0.0230  -0.0226  -0.0222  -0.0218  -0.0213  -0.0209  -0.0204
-0.0237  -0.0235  -0.0232  -0.0229  -0.0226  -0.0222  -0.0219
-0.0243  -0.0242  -0.0241  -0.0239  -0.0237  -0.0235  -0.0233
-0.0248  -0.0249  -0.0249  -0.0249  -0.0248  -0.0247  -0.0245
   0.9747  -0.0255  -0.0257  -0.0257  -0.0258  -0.0258  -0.0257
-0.0257   0.9739  -0.0263  -0.0265  -0.0267  -0.0268  -0.0268
-0.0261  -0.0265   0.9731  -0.0272  -0.0275  -0.0277  -0.0278
-0.0264  -0.0269  -0.0274   0.9722  -0.0282  -0.0285  -0.0287
-0.0266  -0.0273  -0.0279  -0.0284   0.9712  -0.0292  -0.0295
-0.0267  -0.0275  -0.0282  -0.0288  -0.0294   0.9702  -0.0302
-0.0268  -0.0277  -0.0285  -0.0292  -0.0298  -0.0303   0.9692
-0.0269  -0.0278  -0.0287  -0.0295  -0.0302  -0.0308  -0.0313
-0.0269  -0.0279  -0.0288  -0.0297  -0.0305  -0.0311  -0.0317
-0.0268  -0.0279  -0.0289  -0.0298  -0.0306  -0.0314  -0.0320
-0.0266  -0.0278  -0.0289  -0.0299  -0.0307  -0.0315  -0.0322
-0.0264  -0.0276  -0.0288  -0.0298  -0.0308  -0.0316  -0.0323
-0.0261  -0.0274  -0.0286  -0.0297  -0.0307  -0.0316  -0.0323
-0.0258  -0.0271  -0.0283  -0.0295  -0.0305  -0.0314  -0.0323
-0.0254  -0.0267  -0.0280  -0.0292  -0.0303  -0.0312  -0.0321
-0.0249  -0.0263  -0.0276  -0.0288  -0.0299  -0.0309  -0.0318
-0.0244  -0.0258  -0.0271  -0.0284  -0.0295  -0.0305  -0.0314
-0.0238  -0.0252  -0.0266  -0.0278  -0.0290  -0.0300  -0.0310
-0.0231  -0.0246  -0.0259  -0.0272  -0.0284  -0.0294  -0.0304
-0.0224  -0.0238  -0.0252  -0.0265  -0.0277  -0.0288  -0.0297
-0.0216  -0.0230  -0.0244  -0.0257  -0.0269  -0.0280  -0.0290
-0.0207  -0.0222  -0.0235  -0.0248  -0.0260  -0.0271  -0.0281
-0.0198  -0.0213  -0.0226  -0.0239  -0.0251  -0.0262  -0.0272
-0.0188  -0.0203  -0.0216  -0.0228  -0.0240  -0.0251  -0.0261
-0.0178  -0.0192  -0.0205  -0.0217  -0.0229  -0.0240  -0.0250
-0.0167  -0.0180  -0.0193  -0.0205  -0.0217  -0.0227  -0.0237
-0.0155  -0.0168  -0.0181  -0.0192  -0.0203  -0.0214  -0.0224
-0.0143  -0.0155  -0.0167  -0.0179  -0.0189  -0.0200  -0.0209
-0.0130  -0.0142  -0.0153  -0.0164  -0.0175  -0.0185  -0.0194
-0.0116  -0.0128  -0.0138  -0.0149  -0.0159  -0.0168  -0.0178
-0.0102  -0.0113  -0.0123  -0.0133  -0.0142  -0.0151  -0.0160
-0.0087  -0.0097  -0.0107  -0.0116  -0.0125  -0.0133  -0.0142
-0.0072  -0.0081  -0.0089  -0.0098  -0.0106  -0.0115  -0.0123
-0.0056  -0.0064  -0.0072  -0.0079  -0.0087  -0.0095  -0.0103
-0.0039  -0.0046  -0.0053  -0.0060  -0.0067  -0.0074  -0.0081
-0.0022  -0.0027  -0.0033  -0.0040  -0.0046  -0.0052  -0.0059
-0.0004  -0.0008  -0.0013  -0.0018  -0.0024  -0.0030  -0.0036
   0.0015   0.0012   0.0008   0.0003  -0.0001  -0.0006  -0.0012
   0.0034   0.0032   0.0029   0.0026   0.0022   0.0018   0.0013
   0.0054   0.0053   0.0052   0.0050   0.0047   0.0043   0.0039
   0.0075   0.0075   0.0075   0.0074   0.0072   0.0070   0.0066
   0.0096   0.0098   0.0099   0.0099   0.0099   0.0097   0.0094
   0.0118   0.0121   0.0124   0.0126   0.0126   0.0125   0.0123
   0.0140   0.0145   0.0150   0.0152   0.0154   0.0154   0.0153
   0.0163   0.0170   0.0176   0.0180   0.0183   0.0184   0.0184
   0.0187   0.0196   0.0203   0.0209   0.0213   0.0215   0.0216
   0.0211   0.0222   0.0231   0.0238   0.0243   0.0247   0.0249
   0.0236   0.0249   0.0259   0.0268   0.0275   0.0280   0.0283
```

Columns 22 through 28

```
-0.1098  -0.1088  -0.1079  -0.1071  -0.1063  -0.1057  -0.1051
-0.0371  -0.0302  -0.0234  -0.0166  -0.0098  -0.0031   0.0036
 0.1322   0.1380   0.1431   0.1473   0.1507   0.1534   0.1552
 0.0014   0.0030   0.0046   0.0060   0.0073   0.0085   0.0096
-0.0012   0.0003   0.0017   0.0030   0.0043   0.0054   0.0065
-0.0037  -0.0023  -0.0010   0.0002   0.0014   0.0025   0.0035
-0.0060  -0.0048  -0.0036  -0.0025  -0.0014  -0.0004   0.0006
-0.0083  -0.0072  -0.0061  -0.0050  -0.0041  -0.0031  -0.0022
-0.0105  -0.0095  -0.0085  -0.0075  -0.0066  -0.0057  -0.0049
-0.0126  -0.0117  -0.0108  -0.0099  -0.0091  -0.0082  -0.0074
-0.0146  -0.0138  -0.0130  -0.0122  -0.0114  -0.0106  -0.0099
-0.0165  -0.0157  -0.0150  -0.0143  -0.0136  -0.0129  -0.0122
-0.0182  -0.0176  -0.0170  -0.0164  -0.0157  -0.0151  -0.0144
-0.0199  -0.0194  -0.0189  -0.0183  -0.0177  -0.0171  -0.0165
-0.0215  -0.0211  -0.0206  -0.0201  -0.0196  -0.0191  -0.0185
-0.0230  -0.0226  -0.0223  -0.0218  -0.0214  -0.0209  -0.0204
-0.0243  -0.0241  -0.0238  -0.0235  -0.0231  -0.0226  -0.0222
-0.0256  -0.0254  -0.0252  -0.0250  -0.0246  -0.0243  -0.0238
-0.0268  -0.0267  -0.0266  -0.0263  -0.0261  -0.0258  -0.0254
-0.0279  -0.0278  -0.0278  -0.0276  -0.0274  -0.0272  -0.0268
-0.0288  -0.0289  -0.0289  -0.0288  -0.0287  -0.0284  -0.0281
-0.0297  -0.0298  -0.0299  -0.0299  -0.0298  -0.0296  -0.0293
-0.0305  -0.0307  -0.0308  -0.0308  -0.0308  -0.0306  -0.0304
-0.0311  -0.0314  -0.0316  -0.0317  -0.0317  -0.0316  -0.0314
 0.9683  -0.0320  -0.0323  -0.0324  -0.0325  -0.0324  -0.0323
```

-0.0322 0.9675 -0.0328 -0.0330 -0.0331 -0.0331 -0.0331
-0.0325 -0.0330 0.9667 -0.0336 -0.0337 -0.0337 -0.0337
-0.0328 -0.0333 -0.0337 0.9660 -0.0342 -0.0342 -0.0342
-0.0330 -0.0335 -0.0339 -0.0343 0.9655 -0.0346 -0.0347
-0.0330 -0.0336 -0.0341 -0.0345 -0.0347 0.9651 -0.0350
-0.0330 -0.0336 -0.0341 -0.0345 -0.0348 -0.0351 0.9648
-0.0328 -0.0335 -0.0341 -0.0345 -0.0349 -0.0351 -0.0352
-0.0326 -0.0333 -0.0339 -0.0344 -0.0348 -0.0350 -0.0352
-0.0323 -0.0330 -0.0336 -0.0341 -0.0345 -0.0349 -0.0351
-0.0318 -0.0326 -0.0332 -0.0338 -0.0342 -0.0346 -0.0348
-0.0313 -0.0321 -0.0327 -0.0333 -0.0338 -0.0342 -0.0345
-0.0306 -0.0314 -0.0321 -0.0327 -0.0333 -0.0337 -0.0340
-0.0299 -0.0307 -0.0314 -0.0321 -0.0326 -0.0330 -0.0334
-0.0290 -0.0299 -0.0306 -0.0313 -0.0318 -0.0323 -0.0327
-0.0281 -0.0289 -0.0297 -0.0304 -0.0310 -0.0315 -0.0319
-0.0270 -0.0279 -0.0287 -0.0294 -0.0300 -0.0305 -0.0310
-0.0259 -0.0268 -0.0275 -0.0283 -0.0289 -0.0294 -0.0299
-0.0247 -0.0255 -0.0263 -0.0270 -0.0277 -0.0283 -0.0288
-0.0233 -0.0242 -0.0250 -0.0257 -0.0264 -0.0270 -0.0275
-0.0218 -0.0227 -0.0235 -0.0242 -0.0249 -0.0256 -0.0261
-0.0203 -0.0211 -0.0219 -0.0227 -0.0234 -0.0241 -0.0247
-0.0186 -0.0195 -0.0203 -0.0210 -0.0218 -0.0224 -0.0231
-0.0169 -0.0177 -0.0185 -0.0193 -0.0200 -0.0207 -0.0214
-0.0150 -0.0158 -0.0166 -0.0174 -0.0181 -0.0188 -0.0195
-0.0131 -0.0139 -0.0146 -0.0154 -0.0161 -0.0169 -0.0176
-0.0110 -0.0118 -0.0125 -0.0133 -0.0141 -0.0148 -0.0155
-0.0089 -0.0096 -0.0103 -0.0111 -0.0118 -0.0126 -0.0134
-0.0066 -0.0073 -0.0080 -0.0088 -0.0095 -0.0103 -0.0111
-0.0042 -0.0049 -0.0056 -0.0064 -0.0071 -0.0079 -0.0087
-0.0018 -0.0024 -0.0031 -0.0038 -0.0046 -0.0054 -0.0062
 0.0008 0.0002 -0.0005 -0.0012 -0.0019 -0.0028 -0.0036
 0.0034 0.0029 0.0023 0.0016 0.0008 -0.0000 -0.0009
 0.0062 0.0057 0.0051 0.0044 0.0037 0.0028 0.0019
 0.0091 0.0086 0.0081 0.0074 0.0067 0.0058 0.0049
 0.0120 0.0116 0.0111 0.0105 0.0097 0.0089 0.0079
 0.0151 0.0148 0.0143 0.0137 0.0129 0.0121 0.0111
 0.0183 0.0180 0.0175 0.0170 0.0163 0.0154 0.0144
 0.0215 0.0213 0.0209 0.0204 0.0197 0.0188 0.0178
 0.0249 0.0247 0.0244 0.0239 0.0232 0.0223 0.0213
 0.0284 0.0283 0.0280 0.0275 0.0268 0.0260 0.0249

Columns 29 through 35

-0.1046 -0.1042 -0.1039 -0.1036 -0.1035 -0.1034 -0.1035
 0.0103 0.0169 0.0235 0.0301 0.0366 0.0431 0.0496
 0.1563 0.1565 0.1559 0.1546 0.1524 0.1494 0.1456
 0.0106 0.0115 0.0123 0.0129 0.0135 0.0140 0.0144
 0.0074 0.0083 0.0091 0.0098 0.0104 0.0109 0.0113
 0.0044 0.0052 0.0060 0.0067 0.0073 0.0079 0.0083
 0.0015 0.0023 0.0030 0.0037 0.0044 0.0050 0.0055
-0.0014 -0.0006 0.0002 0.0009 0.0015 0.0021 0.0027
-0.0041 -0.0033 -0.0026 -0.0019 -0.0012 -0.0006 0.0000
-0.0067 -0.0059 -0.0052 -0.0045 -0.0038 -0.0032 -0.0025
-0.0091 -0.0084 -0.0077 -0.0070 -0.0063 -0.0056 -0.0050
-0.0115 -0.0108 -0.0101 -0.0094 -0.0087 -0.0080 -0.0073
-0.0138 -0.0131 -0.0124 -0.0117 -0.0110 -0.0103 -0.0096
-0.0159 -0.0153 -0.0146 -0.0139 -0.0132 -0.0125 -0.0118
-0.0179 -0.0173 -0.0167 -0.0160 -0.0153 -0.0146 -0.0138
-0.0199 -0.0193 -0.0186 -0.0180 -0.0173 -0.0166 -0.0158
-0.0217 -0.0211 -0.0205 -0.0199 -0.0192 -0.0184 -0.0176
-0.0234 -0.0228 -0.0222 -0.0216 -0.0209 -0.0202 -0.0194
-0.0249 -0.0244 -0.0239 -0.0233 -0.0226 -0.0218 -0.0210
-0.0264 -0.0259 -0.0254 -0.0248 -0.0241 -0.0234 -0.0226
-0.0278 -0.0273 -0.0268 -0.0262 -0.0256 -0.0249 -0.0241
-0.0290 -0.0286 -0.0281 -0.0276 -0.0269 -0.0262 -0.0254
-0.0301 -0.0298 -0.0293 -0.0288 -0.0281 -0.0274 -0.0267
-0.0312 -0.0308 -0.0304 -0.0299 -0.0293 -0.0286 -0.0278
-0.0321 -0.0318 -0.0314 -0.0309 -0.0303 -0.0296 -0.0289
-0.0329 -0.0326 -0.0322 -0.0318 -0.0312 -0.0305 -0.0298
-0.0336 -0.0333 -0.0330 -0.0325 -0.0320 -0.0314 -0.0306
-0.0341 -0.0339 -0.0336 -0.0332 -0.0327 -0.0321 -0.0314
-0.0346 -0.0344 -0.0341 -0.0338 -0.0333 -0.0327 -0.0320
-0.0349 -0.0348 -0.0346 -0.0342 -0.0338 -0.0332 -0.0326
-0.0352 -0.0351 -0.0349 -0.0346 -0.0341 -0.0336 -0.0330
 0.9647 -0.0352 -0.0351 -0.0348 -0.0344 -0.0339 -0.0334
-0.0353 0.9647 -0.0351 -0.0349 -0.0346 -0.0341 -0.0336
-0.0352 -0.0352 0.9649 -0.0349 -0.0346 -0.0342 -0.0337
-0.0350 -0.0350 -0.0350 0.9652 -0.0346 -0.0342 -0.0338
-0.0347 -0.0347 -0.0347 -0.0346 0.9656 -0.0341 -0.0337
-0.0342 -0.0343 -0.0344 -0.0343 -0.0342 0.9661 -0.0336
-0.0337 -0.0338 -0.0339 -0.0339 -0.0338 -0.0336 0.9667
-0.0330 -0.0332 -0.0333 -0.0334 -0.0333 -0.0332 -0.0329
-0.0322 -0.0325 -0.0326 -0.0327 -0.0327 -0.0326 -0.0325
-0.0313 -0.0316 -0.0318 -0.0320 -0.0320 -0.0320 -0.0319
-0.0303 -0.0307 -0.0309 -0.0311 -0.0312 -0.0313 -0.0312
-0.0292 -0.0296 -0.0299 -0.0302 -0.0303 -0.0304 -0.0305
-0.0280 -0.0284 -0.0288 -0.0291 -0.0293 -0.0295 -0.0296
-0.0267 -0.0271 -0.0275 -0.0279 -0.0282 -0.0284 -0.0286
-0.0252 -0.0257 -0.0262 -0.0266 -0.0270 -0.0273 -0.0275
-0.0237 -0.0242 -0.0247 -0.0252 -0.0256 -0.0260 -0.0264
-0.0220 -0.0226 -0.0231 -0.0237 -0.0242 -0.0247 -0.0251
-0.0202 -0.0208 -0.0215 -0.0221 -0.0226 -0.0232 -0.0237
-0.0183 -0.0190 -0.0197 -0.0203 -0.0210 -0.0216 -0.0222
-0.0163 -0.0170 -0.0178 -0.0185 -0.0192 -0.0199 -0.0207
-0.0142 -0.0150 -0.0157 -0.0165 -0.0174 -0.0182 -0.0190
-0.0119 -0.0128 -0.0136 -0.0145 -0.0154 -0.0163 -0.0172
-0.0096 -0.0105 -0.0114 -0.0123 -0.0133 -0.0143 -0.0153
-0.0071 -0.0081 -0.0090 -0.0100 -0.0111 -0.0122 -0.0134
-0.0046 -0.0055 -0.0066 -0.0077 -0.0088 -0.0100 -0.0113
-0.0019 -0.0029 -0.0040 -0.0052 -0.0064 -0.0077 -0.0091
 0.0009 -0.0002 -0.0013 -0.0026 -0.0039 -0.0053 -0.0068
 0.0038 0.0027 0.0015 0.0001 -0.0013 -0.0028 -0.0044
 0.0069 0.0057 0.0044 0.0030 0.0014 -0.0002 -0.0019
 0.0100 0.0087 0.0074 0.0059 0.0043 0.0025 0.0007
 0.0132 0.0119 0.0105 0.0089 0.0072 0.0053 0.0033

0.0166	0.0152	0.0137	0.0121	0.0103	0.0083	0.0061
0.0201	0.0187	0.0171	0.0153	0.0134	0.0113	0.0090
0.0236	0.0222	0.0205	0.0187	0.0167	0.0144	0.0120

Columns 36 through 42

-0.1036	-0.1038	-0.1041	-0.1045	-0.1050	-0.1055	-0.1062
0.0560	0.0624	0.0687	0.0751	0.0814	0.0876	0.0938
0.1411	0.1357	0.1295	0.1225	0.1148	0.1062	0.0968
0.0146	0.0148	0.0149	0.0148	0.0147	0.0144	0.0141
0.0116	0.0119	0.0120	0.0121	0.0121	0.0120	0.0118
0.0087	0.0090	0.0093	0.0095	0.0096	0.0096	0.0095
0.0059	0.0063	0.0066	0.0069	0.0071	0.0073	0.0073
0.0032	0.0037	0.0041	0.0044	0.0048	0.0050	0.0052
0.0006	0.0011	0.0016	0.0021	0.0025	0.0028	0.0032
-0.0019	-0.0013	-0.0008	-0.0003	0.0003	0.0007	0.0012
-0.0043	-0.0037	-0.0031	-0.0025	-0.0019	-0.0013	-0.0007
-0.0067	-0.0060	-0.0053	-0.0046	-0.0039	-0.0033	-0.0026
-0.0089	-0.0082	-0.0074	-0.0067	-0.0059	-0.0051	-0.0044
-0.0110	-0.0102	-0.0095	-0.0086	-0.0078	-0.0070	-0.0061
-0.0130	-0.0122	-0.0114	-0.0105	-0.0096	-0.0087	-0.0078
-0.0150	-0.0141	-0.0133	-0.0123	-0.0114	-0.0104	-0.0094
-0.0168	-0.0159	-0.0150	-0.0141	-0.0131	-0.0120	-0.0109
-0.0186	-0.0177	-0.0167	-0.0157	-0.0147	-0.0136	-0.0124
-0.0202	-0.0193	-0.0183	-0.0173	-0.0162	-0.0150	-0.0138
-0.0217	-0.0208	-0.0198	-0.0187	-0.0176	-0.0164	-0.0152
-0.0232	-0.0222	-0.0212	-0.0201	-0.0190	-0.0178	-0.0165
-0.0245	-0.0236	-0.0226	-0.0215	-0.0203	-0.0190	-0.0177
-0.0258	-0.0248	-0.0238	-0.0227	-0.0215	-0.0202	-0.0188
-0.0269	-0.0260	-0.0250	-0.0238	-0.0226	-0.0213	-0.0199
-0.0280	-0.0271	-0.0260	-0.0249	-0.0237	-0.0224	-0.0210
-0.0290	-0.0280	-0.0270	-0.0259	-0.0247	-0.0233	-0.0219
-0.0298	-0.0289	-0.0279	-0.0268	-0.0256	-0.0243	-0.0228
-0.0306	-0.0297	-0.0287	-0.0276	-0.0264	-0.0251	-0.0237
-0.0313	-0.0304	-0.0294	-0.0283	-0.0271	-0.0259	-0.0245
-0.0318	-0.0310	-0.0300	-0.0290	-0.0278	-0.0266	-0.0252
-0.0323	-0.0315	-0.0306	-0.0295	-0.0284	-0.0272	-0.0258
-0.0327	-0.0319	-0.0310	-0.0300	-0.0289	-0.0277	-0.0264
-0.0330	-0.0322	-0.0314	-0.0304	-0.0294	-0.0282	-0.0270
-0.0331	-0.0324	-0.0316	-0.0307	-0.0297	-0.0286	-0.0274
-0.0332	-0.0326	-0.0318	-0.0310	-0.0300	-0.0290	-0.0278
-0.0332	-0.0326	-0.0319	-0.0311	-0.0302	-0.0293	-0.0282
-0.0331	-0.0326	-0.0319	-0.0312	-0.0304	-0.0295	-0.0284
-0.0329	-0.0324	-0.0319	-0.0312	-0.0304	-0.0296	-0.0287
0.9674	-0.0322	-0.0317	-0.0311	-0.0304	-0.0297	-0.0288
-0.0322	0.9681	-0.0314	-0.0309	-0.0303	-0.0296	-0.0289
-0.0317	-0.0314	0.9689	-0.0307	-0.0302	-0.0296	-0.0289
-0.0311	-0.0309	-0.0307	0.9697	-0.0299	-0.0294	-0.0289
-0.0304	-0.0303	-0.0301	-0.0299	0.9704	-0.0292	-0.0288
-0.0296	-0.0296	-0.0295	-0.0294	-0.0292	0.9711	-0.0286
-0.0287	-0.0288	-0.0288	-0.0288	-0.0287	-0.0286	0.9716
-0.0278	-0.0279	-0.0281	-0.0281	-0.0282	-0.0281	-0.0281
-0.0267	-0.0270	-0.0272	-0.0274	-0.0275	-0.0276	-0.0277
-0.0255	-0.0259	-0.0262	-0.0265	-0.0268	-0.0271	-0.0273
-0.0242	-0.0247	-0.0252	-0.0256	-0.0260	-0.0264	-0.0268
-0.0229	-0.0235	-0.0240	-0.0246	-0.0252	-0.0257	-0.0262
-0.0214	-0.0221	-0.0228	-0.0235	-0.0242	-0.0249	-0.0256
-0.0198	-0.0207	-0.0215	-0.0224	-0.0232	-0.0241	-0.0249
-0.0182	-0.0191	-0.0201	-0.0211	-0.0221	-0.0232	-0.0242
-0.0164	-0.0175	-0.0186	-0.0198	-0.0209	-0.0222	-0.0234
-0.0145	-0.0158	-0.0170	-0.0183	-0.0197	-0.0211	-0.0225
-0.0126	-0.0139	-0.0154	-0.0168	-0.0184	-0.0200	-0.0216
-0.0105	-0.0120	-0.0136	-0.0153	-0.0170	-0.0188	-0.0206
-0.0084	-0.0100	-0.0118	-0.0136	-0.0155	-0.0175	-0.0196
-0.0061	-0.0079	-0.0098	-0.0119	-0.0140	-0.0161	-0.0184
-0.0038	-0.0058	-0.0078	-0.0100	-0.0123	-0.0147	-0.0173
-0.0013	-0.0035	-0.0057	-0.0081	-0.0106	-0.0132	-0.0160
0.0012	-0.0011	-0.0035	-0.0061	-0.0088	-0.0117	-0.0147
0.0038	0.0014	-0.0013	-0.0040	-0.0070	-0.0101	-0.0133
0.0066	0.0039	0.0011	-0.0019	-0.0050	-0.0084	-0.0119
0.0094	0.0066	0.0036	0.0004	-0.0030	-0.0066	-0.0104

Columns 43 through 49

-0.1069	-0.1077	-0.1086	-0.1096	-0.1107	-0.1118	-0.1131
0.1000	0.1062	0.1123	0.1184	0.1244	0.1305	0.1364
0.0866	0.0756	0.0638	0.0513	0.0379	0.0237	0.0087
0.0136	0.0130	0.0124	0.0116	0.0107	0.0097	0.0086
0.0115	0.0111	0.0106	0.0100	0.0094	0.0087	0.0078
0.0094	0.0092	0.0089	0.0085	0.0081	0.0076	0.0070
0.0074	0.0073	0.0072	0.0071	0.0068	0.0065	0.0062
0.0054	0.0055	0.0056	0.0056	0.0056	0.0055	0.0054
0.0035	0.0038	0.0040	0.0042	0.0043	0.0045	0.0045
0.0016	0.0020	0.0024	0.0028	0.0031	0.0034	0.0037
-0.0002	0.0004	0.0009	0.0014	0.0019	0.0024	0.0029
-0.0019	-0.0012	-0.0006	0.0001	0.0008	0.0014	0.0021
-0.0036	-0.0028	-0.0020	-0.0012	-0.0004	0.0004	0.0013
-0.0052	-0.0043	-0.0034	-0.0025	-0.0015	-0.0005	0.0004
-0.0068	-0.0058	-0.0048	-0.0037	-0.0026	-0.0015	-0.0004
-0.0083	-0.0072	-0.0061	-0.0049	-0.0037	-0.0025	-0.0012
-0.0098	-0.0086	-0.0074	-0.0061	-0.0048	-0.0034	-0.0020
-0.0112	-0.0099	-0.0086	-0.0073	-0.0058	-0.0044	-0.0029
-0.0125	-0.0112	-0.0098	-0.0084	-0.0069	-0.0053	-0.0037
-0.0138	-0.0124	-0.0110	-0.0095	-0.0079	-0.0062	-0.0045
-0.0151	-0.0136	-0.0121	-0.0105	-0.0089	-0.0071	-0.0053
-0.0163	-0.0148	-0.0132	-0.0116	-0.0098	-0.0080	-0.0062
-0.0174	-0.0159	-0.0143	-0.0126	-0.0108	-0.0089	-0.0070
-0.0185	-0.0169	-0.0153	-0.0135	-0.0117	-0.0098	-0.0078
-0.0195	-0.0179	-0.0162	-0.0145	-0.0126	-0.0107	-0.0086
-0.0204	-0.0188	-0.0172	-0.0154	-0.0135	-0.0115	-0.0095
-0.0213	-0.0197	-0.0181	-0.0163	-0.0144	-0.0124	-0.0103
-0.0222	-0.0206	-0.0189	-0.0171	-0.0152	-0.0132	-0.0111
-0.0230	-0.0214	-0.0197	-0.0179	-0.0160	-0.0141	-0.0120
-0.0237	-0.0222	-0.0205	-0.0187	-0.0168	-0.0149	-0.0128
-0.0244	-0.0229	-0.0212	-0.0195	-0.0176	-0.0157	-0.0136

-0.0250	-0.0235	-0.0219	-0.0202	-0.0184	-0.0165	-0.0145
-0.0256	-0.0241	-0.0226	-0.0209	-0.0191	-0.0173	-0.0153
-0.0261	-0.0247	-0.0232	-0.0216	-0.0199	-0.0180	-0.0161
-0.0266	-0.0252	-0.0238	-0.0222	-0.0206	-0.0188	-0.0170
-0.0270	-0.0257	-0.0243	-0.0228	-0.0213	-0.0196	-0.0178
-0.0273	-0.0261	-0.0248	-0.0234	-0.0219	-0.0203	-0.0186
-0.0276	-0.0265	-0.0253	-0.0240	-0.0226	-0.0211	-0.0195
-0.0279	-0.0268	-0.0257	-0.0245	-0.0232	-0.0218	-0.0203
-0.0280	-0.0271	-0.0261	-0.0250	-0.0238	-0.0225	-0.0212
-0.0282	-0.0273	-0.0264	-0.0254	-0.0244	-0.0232	-0.0220
-0.0282	-0.0275	-0.0267	-0.0259	-0.0249	-0.0239	-0.0228
-0.0282	-0.0276	-0.0270	-0.0263	-0.0255	-0.0246	-0.0237
-0.0282	-0.0277	-0.0272	-0.0266	-0.0260	-0.0253	-0.0245
-0.0281	-0.0278	-0.0274	-0.0270	-0.0265	-0.0259	-0.0253
0.9721	-0.0278	-0.0275	-0.0273	-0.0270	-0.0266	-0.0262
-0.0277	0.9723	-0.0277	-0.0276	-0.0274	-0.0273	-0.0270
-0.0275	-0.0276	0.9723	-0.0278	-0.0279	-0.0279	-0.0279
-0.0271	-0.0275	-0.0278	0.9720	-0.0283	-0.0285	-0.0287
-0.0268	-0.0273	-0.0277	-0.0282	0.9713	-0.0291	-0.0296
-0.0263	-0.0270	-0.0277	-0.0284	-0.0291	0.9703	-0.0304
-0.0258	-0.0267	-0.0276	-0.0285	-0.0294	-0.0303	0.9687
-0.0253	-0.0264	-0.0275	-0.0286	-0.0298	-0.0309	-0.0321
-0.0247	-0.0260	-0.0273	-0.0287	-0.0301	-0.0315	-0.0329
-0.0240	-0.0255	-0.0271	-0.0287	-0.0304	-0.0321	-0.0338
-0.0233	-0.0251	-0.0269	-0.0287	-0.0306	-0.0326	-0.0346
-0.0225	-0.0245	-0.0266	-0.0287	-0.0309	-0.0332	-0.0355
-0.0217	-0.0239	-0.0263	-0.0287	-0.0311	-0.0337	-0.0363
-0.0208	-0.0233	-0.0259	-0.0286	-0.0314	-0.0342	-0.0372
-0.0199	-0.0226	-0.0255	-0.0285	-0.0315	-0.0347	-0.0380
-0.0189	-0.0219	-0.0251	-0.0283	-0.0317	-0.0352	-0.0389
-0.0178	-0.0211	-0.0246	-0.0282	-0.0319	-0.0357	-0.0397
-0.0167	-0.0203	-0.0241	-0.0280	-0.0320	-0.0362	-0.0406
-0.0156	-0.0195	-0.0235	-0.0277	-0.0321	-0.0367	-0.0414
-0.0144	-0.0185	-0.0229	-0.0275	-0.0322	-0.0372	-0.0423

Columns 50 through 56

-0.1144	-0.1159	-0.1174	-0.1190	-0.1207	-0.1225	-0.1243
0.1424	0.1483	0.1542	0.1600	0.1659	0.1716	0.1774
-0.0071	-0.0237	-0.0411	-0.0593	-0.0783	-0.0981	-0.1187
0.0074	0.0062	0.0048	0.0033	0.0016	-0.0001	-0.0019
0.0069	0.0059	0.0048	0.0036	0.0023	0.0010	-0.0005
0.0063	0.0056	0.0048	0.0039	0.0029	0.0019	0.0008
0.0058	0.0053	0.0048	0.0042	0.0035	0.0028	0.0020
0.0052	0.0050	0.0047	0.0044	0.0040	0.0036	0.0031
0.0046	0.0046	0.0046	0.0045	0.0044	0.0043	0.0041
0.0040	0.0042	0.0044	0.0046	0.0048	0.0050	0.0051
0.0034	0.0038	0.0043	0.0047	0.0051	0.0055	0.0059
0.0027	0.0034	0.0041	0.0047	0.0054	0.0060	0.0067
0.0021	0.0030	0.0038	0.0047	0.0055	0.0064	0.0073
0.0015	0.0025	0.0035	0.0046	0.0057	0.0068	0.0079
0.0008	0.0020	0.0032	0.0045	0.0057	0.0070	0.0084
0.0001	0.0015	0.0028	0.0043	0.0057	0.0072	0.0088
-0.0006	0.0009	0.0025	0.0040	0.0057	0.0073	0.0090
-0.0013	0.0003	0.0020	0.0038	0.0055	0.0074	0.0092
-0.0020	-0.0002	0.0016	0.0034	0.0053	0.0073	0.0094
-0.0027	-0.0009	0.0011	0.0030	0.0051	0.0072	0.0094
-0.0035	-0.0015	0.0005	0.0026	0.0048	0.0070	0.0093
-0.0042	-0.0022	-0.0001	0.0021	0.0044	0.0067	0.0092
-0.0050	-0.0029	-0.0007	0.0016	0.0040	0.0064	0.0089
-0.0057	-0.0036	-0.0013	0.0010	0.0035	0.0060	0.0086
-0.0065	-0.0043	-0.0020	0.0004	0.0029	0.0055	0.0081
-0.0073	-0.0051	-0.0027	-0.0003	0.0023	0.0049	0.0076
-0.0081	-0.0058	-0.0035	-0.0010	0.0016	0.0042	0.0070
-0.0089	-0.0067	-0.0043	-0.0018	0.0008	0.0035	0.0063
-0.0098	-0.0075	-0.0051	-0.0026	0.0000	0.0027	0.0055
-0.0106	-0.0083	-0.0060	-0.0035	-0.0009	0.0018	0.0046
-0.0115	-0.0092	-0.0069	-0.0044	-0.0018	0.0009	0.0036
-0.0123	-0.0101	-0.0078	-0.0054	-0.0028	-0.0002	0.0026
-0.0132	-0.0110	-0.0088	-0.0064	-0.0039	-0.0013	0.0014
-0.0141	-0.0120	-0.0098	-0.0074	-0.0050	-0.0025	0.0001
-0.0150	-0.0130	-0.0108	-0.0086	-0.0062	-0.0037	-0.0012
-0.0159	-0.0140	-0.0119	-0.0097	-0.0075	-0.0051	-0.0026
-0.0169	-0.0150	-0.0130	-0.0109	-0.0088	-0.0065	-0.0041
-0.0178	-0.0160	-0.0142	-0.0122	-0.0101	-0.0080	-0.0058
-0.0187	-0.0171	-0.0153	-0.0135	-0.0116	-0.0096	-0.0075
-0.0197	-0.0182	-0.0166	-0.0149	-0.0131	-0.0112	-0.0093
-0.0207	-0.0193	-0.0178	-0.0163	-0.0146	-0.0129	-0.0112
-0.0217	-0.0204	-0.0191	-0.0177	-0.0163	-0.0147	-0.0131
-0.0227	-0.0216	-0.0205	-0.0192	-0.0180	-0.0166	-0.0152
-0.0237	-0.0228	-0.0218	-0.0208	-0.0197	-0.0186	-0.0174
-0.0247	-0.0240	-0.0232	-0.0224	-0.0215	-0.0206	-0.0196
-0.0257	-0.0252	-0.0247	-0.0241	-0.0234	-0.0227	-0.0220
-0.0268	-0.0265	-0.0261	-0.0258	-0.0253	-0.0249	-0.0244
-0.0278	-0.0278	-0.0277	-0.0275	-0.0273	-0.0271	-0.0269
-0.0289	-0.0291	-0.0292	-0.0293	-0.0294	-0.0295	-0.0295
-0.0300	-0.0304	-0.0308	-0.0312	-0.0315	-0.0319	-0.0322
-0.0311	-0.0317	-0.0324	-0.0331	-0.0337	-0.0344	-0.0350
-0.0322	-0.0331	-0.0341	-0.0350	-0.0360	-0.0369	-0.0379
0.9667	-0.0345	-0.0358	-0.0370	-0.0383	-0.0396	-0.0409
-0.0344	0.9641	-0.0375	-0.0391	-0.0407	-0.0423	-0.0440
-0.0356	-0.0374	0.9607	-0.0412	-0.0431	-0.0451	-0.0471
-0.0367	-0.0389	-0.0411	0.9567	-0.0456	-0.0480	-0.0504
-0.0379	-0.0404	-0.0429	-0.0455	0.9518	-0.0509	-0.0537
-0.0391	-0.0419	-0.0448	-0.0477	-0.0508	0.9461	-0.0571
-0.0403	-0.0434	-0.0467	-0.0500	-0.0535	-0.0570	0.9393
-0.0415	-0.0450	-0.0486	-0.0524	-0.0562	-0.0602	-0.0643
-0.0427	-0.0466	-0.0506	-0.0548	-0.0590	-0.0635	-0.0680
-0.0439	-0.0482	-0.0526	-0.0572	-0.0619	-0.0668	-0.0718
-0.0451	-0.0498	-0.0547	-0.0597	-0.0649	-0.0702	-0.0757
-0.0464	-0.0515	-0.0568	-0.0622	-0.0679	-0.0737	-0.0797
-0.0476	-0.0532	-0.0589	-0.0648	-0.0709	-0.0772	-0.0837

Columns 57 through 62

-0.1263	-0.1283	-0.1304	-0.1327	-0.1350	-0.1373
0.1831	0.1888	0.1944	0.2000	0.2056	0.2111
-0.1401	-0.1623	-0.1853	-0.2091	-0.2337	-0.2592
-0.0038	-0.0058	-0.0080	-0.0102	-0.0125	-0.0150
-0.0020	-0.0037	-0.0054	-0.0072	-0.0091	-0.0111
-0.0004	-0.0017	-0.0030	-0.0044	-0.0059	-0.0075
0.0012	0.0003	-0.0007	-0.0017	-0.0028	-0.0040
0.0026	0.0020	0.0014	0.0008	0.0000	-0.0007
0.0039	0.0037	0.0034	0.0031	0.0028	0.0024
0.0052	0.0052	0.0053	0.0053	0.0053	0.0053
0.0063	0.0067	0.0070	0.0073	0.0077	0.0080
0.0073	0.0080	0.0086	0.0092	0.0099	0.0105
0.0082	0.0091	0.0100	0.0110	0.0119	0.0128
0.0090	0.0102	0.0114	0.0125	0.0138	0.0150
0.0097	0.0111	0.0125	0.0140	0.0154	0.0169
0.0103	0.0119	0.0136	0.0152	0.0169	0.0187
0.0108	0.0126	0.0145	0.0164	0.0183	0.0203
0.0112	0.0132	0.0152	0.0173	0.0195	0.0217
0.0115	0.0136	0.0158	0.0181	0.0205	0.0228
0.0116	0.0139	0.0163	0.0188	0.0213	0.0239
0.0117	0.0141	0.0167	0.0193	0.0219	0.0247
0.0117	0.0142	0.0169	0.0196	0.0224	0.0253
0.0115	0.0142	0.0170	0.0198	0.0227	0.0257
0.0113	0.0140	0.0169	0.0198	0.0229	0.0260
0.0109	0.0137	0.0167	0.0197	0.0228	0.0260
0.0104	0.0133	0.0163	0.0194	0.0226	0.0259
0.0099	0.0128	0.0159	0.0190	0.0223	0.0256
0.0092	0.0122	0.0152	0.0184	0.0217	0.0251
0.0084	0.0114	0.0145	0.0177	0.0210	0.0244
0.0075	0.0105	0.0136	0.0168	0.0201	0.0235
0.0065	0.0095	0.0126	0.0158	0.0190	0.0224
0.0054	0.0083	0.0114	0.0146	0.0178	0.0212
0.0042	0.0071	0.0101	0.0132	0.0164	0.0197
0.0029	0.0057	0.0086	0.0117	0.0148	0.0181
0.0015	0.0042	0.0071	0.0100	0.0131	0.0162
-0.0001	0.0026	0.0053	0.0082	0.0112	0.0142
-0.0017	0.0009	0.0035	0.0062	0.0091	0.0120
-0.0034	-0.0010	0.0015	0.0041	0.0068	0.0096
-0.0053	-0.0030	-0.0006	0.0018	0.0044	0.0070
-0.0072	-0.0051	-0.0029	-0.0006	0.0018	0.0042
-0.0093	-0.0073	-0.0053	-0.0032	-0.0010	0.0013
-0.0114	-0.0097	-0.0079	-0.0059	-0.0040	-0.0019
-0.0137	-0.0122	-0.0105	-0.0088	-0.0071	-0.0052
-0.0161	-0.0148	-0.0134	-0.0119	-0.0104	-0.0088
-0.0186	-0.0175	-0.0163	-0.0151	-0.0138	-0.0125
-0.0212	-0.0203	-0.0194	-0.0185	-0.0175	-0.0164
-0.0238	-0.0233	-0.0226	-0.0220	-0.0213	-0.0205
-0.0266	-0.0263	-0.0260	-0.0257	-0.0253	-0.0248
-0.0295	-0.0295	-0.0295	-0.0295	-0.0294	-0.0293
-0.0326	-0.0329	-0.0332	-0.0335	-0.0337	-0.0340
-0.0357	-0.0363	-0.0370	-0.0376	-0.0382	-0.0388
-0.0389	-0.0399	-0.0409	-0.0419	-0.0429	-0.0439
-0.0422	-0.0436	-0.0449	-0.0463	-0.0477	-0.0491
-0.0457	-0.0474	-0.0491	-0.0509	-0.0527	-0.0546
-0.0492	-0.0513	-0.0535	-0.0557	-0.0579	-0.0602
-0.0528	-0.0554	-0.0579	-0.0606	-0.0633	-0.0660
-0.0566	-0.0595	-0.0625	-0.0656	-0.0688	-0.0720
-0.0604	-0.0638	-0.0673	-0.0708	-0.0745	-0.0782
-0.0644	-0.0682	-0.0722	-0.0762	-0.0803	-0.0846
0.9315	-0.0728	-0.0772	-0.0817	-0.0864	-0.0911
-0.0727	0.9226	-0.0824	-0.0874	-0.0926	-0.0979
-0.0769	-0.0822	0.9123	-0.0932	-0.0990	-0.1048
-0.0813	-0.0871	-0.0931	0.9008	-0.1055	-0.1120
-0.0858	-0.0922	-0.0987	-0.1054	0.8878	-0.1193
-0.0904	-0.0973	-0.1044	-0.1117	-0.1191	0.8732

OSSERVAZIONI

Si nota che la prima matrice presenta nucleo banale, in quanto la matrice è nulla (NB: ha comunque dim. 3), mentre la seconda ha un nucleo di dim. 65x62.
Procediamo confrontandoli con i vettori destri:

Vt =

Columns 1 through 7

-0.0862	0.1929	0.2927	-0.1513	-0.1484	-0.1457	-0.1430
-0.0870	0.1899	0.2671	-0.1892	-0.1816	-0.1741	-0.1666
-0.0878	0.1868	0.2424	-0.1757	-0.1530	-0.1311	-0.1101
-0.0886	0.1836	0.2185	0.9433	-0.0529	-0.0492	-0.0456
-0.0894	0.1803	0.1953	-0.0533	0.9501	-0.0466	-0.0434
-0.0902	0.1769	0.1729	-0.0499	-0.0470	0.9559	-0.0413
-0.0911	0.1733	0.1513	-0.0467	-0.0441	-0.0416	0.9608
-0.0920	0.1697	0.1305	-0.0435	-0.0414	-0.0393	-0.0372
-0.0928	0.1659	0.1104	-0.0405	-0.0387	-0.0369	-0.0352
-0.0937	0.1621	0.0912	-0.0375	-0.0361	-0.0347	-0.0333
-0.0946	0.1581	0.0727	-0.0346	-0.0336	-0.0325	-0.0314
-0.0956	0.1541	0.0550	-0.0318	-0.0311	-0.0303	-0.0296
-0.0965	0.1499	0.0381	-0.0292	-0.0287	-0.0283	-0.0278
-0.0975	0.1456	0.0219	-0.0266	-0.0264	-0.0263	-0.0261
-0.0985	0.1412	0.0066	-0.0240	-0.0242	-0.0243	-0.0244
-0.0994	0.1367	-0.0080	-0.0216	-0.0220	-0.0224	-0.0228
-0.1005	0.1320	-0.0218	-0.0193	-0.0200	-0.0206	-0.0212
-0.1015	0.1273	-0.0349	-0.0170	-0.0180	-0.0189	-0.0197

-0.1025	0.1225	-0.0471	-0.0149	-0.0161	-0.0172	-0.0182
-0.1036	0.1175	-0.0586	-0.0128	-0.0142	-0.0155	-0.0168
-0.1047	0.1125	-0.0692	-0.0109	-0.0124	-0.0139	-0.0154
-0.1058	0.1073	-0.0791	-0.0090	-0.0108	-0.0124	-0.0140
-0.1069	0.1020	-0.0883	-0.0072	-0.0091	-0.0110	-0.0128
-0.1080	0.0967	-0.0966	-0.0055	-0.0076	-0.0096	-0.0115
-0.1091	0.0912	-0.1041	-0.0039	-0.0061	-0.0083	-0.0103
-0.1103	0.0856	-0.1109	-0.0024	-0.0048	-0.0070	-0.0092
-0.1114	0.0798	-0.1169	-0.0010	-0.0035	-0.0058	-0.0081
-0.1126	0.0740	-0.1221	0.0003	-0.0022	-0.0047	-0.0071
-0.1138	0.0681	-0.1266	0.0016	-0.0011	-0.0036	-0.0061
-0.1151	0.0621	-0.1302	0.0027	0.0000	-0.0026	-0.0051
-0.1163	0.0559	-0.1331	0.0038	0.0010	-0.0017	-0.0042
-0.1176	0.0497	-0.1352	0.0048	0.0019	-0.0008	-0.0034
-0.1188	0.0433	-0.1365	0.0056	0.0028	0.0000	-0.0026
-0.1201	0.0368	-0.1371	0.0064	0.0036	0.0008	-0.0019
-0.1214	0.0302	-0.1368	0.0071	0.0043	0.0015	-0.0012
-0.1227	0.0235	-0.1358	0.0077	0.0049	0.0021	-0.0005
-0.1241	0.0167	-0.1340	0.0082	0.0054	0.0027	0.0001
-0.1254	0.0098	-0.1314	0.0086	0.0059	0.0032	0.0006
-0.1268	0.0028	-0.1280	0.0090	0.0063	0.0037	0.0011
-0.1282	-0.0043	-0.1239	0.0092	0.0066	0.0040	0.0016
-0.1296	-0.0116	-0.1189	0.0094	0.0068	0.0044	0.0020
-0.1310	-0.0189	-0.1132	0.0094	0.0070	0.0046	0.0023
-0.1324	-0.0264	-0.1067	0.0094	0.0071	0.0048	0.0026
-0.1338	-0.0339	-0.0995	0.0092	0.0071	0.0050	0.0029
-0.1353	-0.0416	-0.0914	0.0090	0.0070	0.0050	0.0031
-0.1368	-0.0494	-0.0826	0.0087	0.0069	0.0050	0.0033
-0.1383	-0.0573	-0.0730	0.0083	0.0066	0.0050	0.0034
-0.1398	-0.0653	-0.0626	0.0078	0.0063	0.0049	0.0034
-0.1413	-0.0734	-0.0514	0.0072	0.0060	0.0047	0.0034
-0.1429	-0.0816	-0.0395	0.0066	0.0055	0.0044	0.0034
-0.1444	-0.0900	-0.0267	0.0058	0.0050	0.0041	0.0033
-0.1460	-0.0984	-0.0132	0.0050	0.0044	0.0038	0.0032
-0.1476	-0.1069	0.0011	0.0040	0.0037	0.0033	0.0030
-0.1492	-0.1156	0.0162	0.0030	0.0029	0.0029	0.0027
-0.1508	-0.1244	0.0320	0.0018	0.0021	0.0023	0.0025
-0.1525	-0.1332	0.0487	0.0006	0.0012	0.0017	0.0021
-0.1541	-0.1422	0.0661	-0.0007	0.0002	0.0010	0.0017
-0.1558	-0.1513	0.0843	-0.0021	-0.0009	0.0003	0.0013
-0.1575	-0.1605	0.1032	-0.0036	-0.0020	-0.0005	0.0008
-0.1592	-0.1698	0.1230	-0.0052	-0.0032	-0.0014	0.0003
-0.1609	-0.1793	0.1435	-0.0068	-0.0045	-0.0023	-0.0003
-0.1627	-0.1888	0.1649	-0.0086	-0.0059	-0.0033	-0.0009
-0.1644	-0.1984	0.1870	-0.0105	-0.0073	-0.0044	-0.0016
-0.1662	-0.2082	0.2098	-0.0124	-0.0089	-0.0055	-0.0023
-0.1680	-0.2180	0.2335	-0.0144	-0.0105	-0.0067	-0.0031

Columns 8 through 14

-0.1404	-0.1379	-0.1355	-0.1332	-0.1310	-0.1288	-0.1268
-0.1591	-0.1516	-0.1442	-0.1368	-0.1295	-0.1222	-0.1149
-0.0898	-0.0703	-0.0517	-0.0338	-0.0167	-0.0005	0.0150
-0.0421	-0.0387	-0.0354	-0.0322	-0.0291	-0.0262	-0.0233
-0.0403	-0.0373	-0.0344	-0.0315	-0.0288	-0.0261	-0.0235
-0.0386	-0.0359	-0.0333	-0.0308	-0.0284	-0.0260	-0.0238
-0.0368	-0.0345	-0.0323	-0.0301	-0.0280	-0.0259	-0.0239
0.9648	-0.0332	-0.0313	-0.0294	-0.0276	-0.0258	-0.0241
-0.0335	0.9681	-0.0303	-0.0287	-0.0272	-0.0257	-0.0242
-0.0319	-0.0306	0.9707	-0.0280	-0.0268	-0.0255	-0.0243
-0.0304	-0.0293	-0.0283	0.9727	-0.0263	-0.0253	-0.0244
-0.0289	-0.0281	-0.0274	-0.0266	0.9741	-0.0251	-0.0244
-0.0274	-0.0269	-0.0264	-0.0259	-0.0254	0.9751	-0.0244
-0.0259	-0.0257	-0.0255	-0.0252	-0.0250	-0.0247	0.9756
-0.0245	-0.0245	-0.0245	-0.0245	-0.0245	-0.0244	-0.0243
-0.0231	-0.0234	-0.0236	-0.0238	-0.0240	-0.0241	-0.0242
-0.0218	-0.0223	-0.0227	-0.0231	-0.0235	-0.0238	-0.0241
-0.0204	-0.0212	-0.0218	-0.0225	-0.0230	-0.0235	-0.0240
-0.0192	-0.0201	-0.0210	-0.0218	-0.0225	-0.0232	-0.0238
-0.0179	-0.0190	-0.0201	-0.0211	-0.0220	-0.0228	-0.0236
-0.0167	-0.0180	-0.0192	-0.0204	-0.0214	-0.0224	-0.0234
-0.0156	-0.0170	-0.0184	-0.0197	-0.0209	-0.0220	-0.0231
-0.0144	-0.0160	-0.0176	-0.0190	-0.0204	-0.0216	-0.0228
-0.0133	-0.0151	-0.0167	-0.0183	-0.0198	-0.0212	-0.0225
-0.0123	-0.0142	-0.0159	-0.0176	-0.0192	-0.0207	-0.0221
-0.0113	-0.0133	-0.0151	-0.0169	-0.0186	-0.0202	-0.0218
-0.0103	-0.0124	-0.0144	-0.0162	-0.0180	-0.0197	-0.0213
-0.0093	-0.0115	-0.0136	-0.0156	-0.0174	-0.0192	-0.0209
-0.0084	-0.0107	-0.0128	-0.0149	-0.0168	-0.0187	-0.0204
-0.0075	-0.0099	-0.0121	-0.0142	-0.0162	-0.0181	-0.0199
-0.0067	-0.0091	-0.0113	-0.0135	-0.0156	-0.0175	-0.0194
-0.0059	-0.0083	-0.0106	-0.0128	-0.0149	-0.0169	-0.0188
-0.0051	-0.0076	-0.0099	-0.0121	-0.0143	-0.0163	-0.0182
-0.0044	-0.0069	-0.0092	-0.0115	-0.0136	-0.0157	-0.0176
-0.0037	-0.0062	-0.0085	-0.0108	-0.0129	-0.0150	-0.0169
-0.0031	-0.0055	-0.0078	-0.0101	-0.0122	-0.0143	-0.0163
-0.0024	-0.0049	-0.0072	-0.0094	-0.0116	-0.0136	-0.0155
-0.0018	-0.0042	-0.0065	-0.0087	-0.0108	-0.0129	-0.0148
-0.0013	-0.0036	-0.0059	-0.0081	-0.0101	-0.0121	-0.0140
-0.0008	-0.0031	-0.0053	-0.0074	-0.0094	-0.0114	-0.0132
-0.0003	-0.0025	-0.0047	-0.0067	-0.0087	-0.0106	-0.0124
0.0001	-0.0020	-0.0040	-0.0060	-0.0079	-0.0098	-0.0115
0.0005	-0.0015	-0.0035	-0.0054	-0.0072	-0.0089	-0.0106
0.0009	-0.0010	-0.0029	-0.0047	-0.0064	-0.0081	-0.0097
0.0012	-0.0006	-0.0023	-0.0040	-0.0056	-0.0072	-0.0087
0.0015	-0.0001	-0.0018	-0.0033	-0.0049	-0.0063	-0.0078
0.0018	0.0003	-0.0012	-0.0027	-0.0041	-0.0054	-0.0068
0.0020	0.0007	-0.0007	-0.0020	-0.0033	-0.0045	-0.0057
0.0022	0.0010	-0.0002	-0.0013	-0.0024	-0.0035	-0.0046
0.0024	0.0014	0.0003	-0.0006	-0.0016	-0.0026	-0.0035
0.0025	0.0017	0.0008	0.0000	-0.0008	-0.0016	-0.0024
0.0026	0.0019	0.0013	0.0007	0.0001	-0.0006	-0.0012
0.0026	0.0022	0.0018	0.0014	0.0009	0.0004	-0.0000
0.0026	0.0025	0.0023	0.0020	0.0018	0.0015	0.0012
0.0026	0.0027	0.0027	0.0027	0.0027	0.0026	0.0024

```
   0.0025   0.0029   0.0031   0.0034   0.0035   0.0037   0.0037
   0.0024   0.0030   0.0036   0.0040   0.0044   0.0048   0.0050
   0.0023   0.0032   0.0040   0.0047   0.0053   0.0059   0.0064
   0.0021   0.0033   0.0044   0.0054   0.0063   0.0071   0.0078
   0.0019   0.0034   0.0048   0.0060   0.0072   0.0082   0.0092
   0.0017   0.0035   0.0051   0.0067   0.0081   0.0094   0.0106
   0.0014   0.0035   0.0055   0.0074   0.0091   0.0106   0.0121
   0.0011   0.0035   0.0059   0.0080   0.0100   0.0119   0.0135
   0.0007   0.0035   0.0062   0.0087   0.0110   0.0131   0.0151
   0.0003   0.0035   0.0065   0.0093   0.0120   0.0144   0.0166
```

Columns 15 through 21

```
-0.1248  -0.1229  -0.1211  -0.1194  -0.1178  -0.1162  -0.1148
-0.1076  -0.1004  -0.0933  -0.0861  -0.0790  -0.0719  -0.0649
   0.0297   0.0435   0.0566   0.0688   0.0803   0.0909   0.1008
-0.0205  -0.0179  -0.0153  -0.0129  -0.0105  -0.0083  -0.0061
-0.0211  -0.0187  -0.0164  -0.0142  -0.0120  -0.0100  -0.0081
-0.0215  -0.0194  -0.0174  -0.0154  -0.0135  -0.0117  -0.0099
-0.0220  -0.0201  -0.0183  -0.0166  -0.0149  -0.0132  -0.0117
-0.0224  -0.0208  -0.0192  -0.0177  -0.0162  -0.0148  -0.0134
-0.0228  -0.0214  -0.0200  -0.0187  -0.0174  -0.0162  -0.0150
-0.0231  -0.0220  -0.0208  -0.0197  -0.0186  -0.0176  -0.0165
-0.0234  -0.0225  -0.0215  -0.0206  -0.0197  -0.0188  -0.0180
-0.0237  -0.0229  -0.0222  -0.0215  -0.0208  -0.0200  -0.0193
-0.0239  -0.0234  -0.0228  -0.0223  -0.0217  -0.0212  -0.0206
-0.0241  -0.0237  -0.0234  -0.0230  -0.0226  -0.0222  -0.0218
   0.9758  -0.0241  -0.0239  -0.0237  -0.0235  -0.0232  -0.0229
-0.0243   0.9757  -0.0243  -0.0243  -0.0242  -0.0241  -0.0239
-0.0244  -0.0246   0.9753  -0.0248  -0.0249  -0.0249  -0.0249
-0.0244  -0.0248  -0.0251   0.9747  -0.0255  -0.0257  -0.0257
-0.0244  -0.0249  -0.0253  -0.0257   0.9739  -0.0263  -0.0265
-0.0243  -0.0250  -0.0256  -0.0261  -0.0265   0.9731  -0.0272
-0.0242  -0.0250  -0.0257  -0.0264  -0.0269  -0.0274   0.9722
-0.0241  -0.0250  -0.0258  -0.0266  -0.0273  -0.0279  -0.0284
-0.0239  -0.0249  -0.0259  -0.0267  -0.0275  -0.0282  -0.0288
-0.0237  -0.0248  -0.0259  -0.0268  -0.0277  -0.0285  -0.0292
-0.0235  -0.0247  -0.0258  -0.0269  -0.0278  -0.0287  -0.0295
-0.0232  -0.0245  -0.0257  -0.0269  -0.0279  -0.0288  -0.0297
-0.0228  -0.0242  -0.0256  -0.0268  -0.0279  -0.0289  -0.0298
-0.0225  -0.0239  -0.0253  -0.0266  -0.0278  -0.0289  -0.0299
-0.0221  -0.0236  -0.0250  -0.0264  -0.0276  -0.0288  -0.0298
-0.0216  -0.0232  -0.0247  -0.0261  -0.0274  -0.0286  -0.0297
-0.0211  -0.0228  -0.0243  -0.0258  -0.0271  -0.0283  -0.0295
-0.0206  -0.0223  -0.0239  -0.0254  -0.0267  -0.0280  -0.0292
-0.0200  -0.0218  -0.0234  -0.0249  -0.0263  -0.0276  -0.0288
-0.0194  -0.0212  -0.0228  -0.0244  -0.0258  -0.0271  -0.0284
-0.0188  -0.0205  -0.0222  -0.0238  -0.0252  -0.0266  -0.0278
-0.0181  -0.0199  -0.0215  -0.0231  -0.0246  -0.0259  -0.0272
-0.0174  -0.0191  -0.0208  -0.0224  -0.0238  -0.0252  -0.0265
-0.0166  -0.0184  -0.0200  -0.0216  -0.0230  -0.0244  -0.0257
-0.0158  -0.0176  -0.0192  -0.0207  -0.0222  -0.0235  -0.0248
-0.0150  -0.0167  -0.0183  -0.0198  -0.0213  -0.0226  -0.0239
-0.0141  -0.0158  -0.0173  -0.0188  -0.0203  -0.0216  -0.0228
-0.0132  -0.0148  -0.0163  -0.0178  -0.0192  -0.0205  -0.0217
-0.0122  -0.0138  -0.0153  -0.0167  -0.0180  -0.0193  -0.0205
-0.0113  -0.0127  -0.0142  -0.0155  -0.0168  -0.0181  -0.0192
-0.0102  -0.0116  -0.0130  -0.0143  -0.0155  -0.0167  -0.0179
-0.0091  -0.0105  -0.0118  -0.0130  -0.0142  -0.0153  -0.0164
-0.0080  -0.0093  -0.0105  -0.0116  -0.0128  -0.0138  -0.0149
-0.0069  -0.0080  -0.0091  -0.0102  -0.0113  -0.0123  -0.0133
-0.0057  -0.0067  -0.0077  -0.0087  -0.0097  -0.0107  -0.0116
-0.0045  -0.0054  -0.0063  -0.0072  -0.0081  -0.0089  -0.0098
-0.0032  -0.0040  -0.0048  -0.0056  -0.0064  -0.0072  -0.0079
-0.0019  -0.0026  -0.0032  -0.0039  -0.0046  -0.0053  -0.0060
-0.0005  -0.0011  -0.0016  -0.0022  -0.0027  -0.0033  -0.0040
   0.0008   0.0005   0.0001  -0.0004  -0.0008  -0.0013  -0.0018
   0.0023   0.0021   0.0018   0.0015   0.0012   0.0008   0.0003
   0.0037   0.0037   0.0036   0.0034   0.0032   0.0029   0.0026
   0.0052   0.0054   0.0054   0.0054   0.0053   0.0052   0.0050
   0.0068   0.0071   0.0073   0.0075   0.0075   0.0075   0.0074
   0.0084   0.0089   0.0093   0.0096   0.0098   0.0099   0.0099
   0.0100   0.0107   0.0113   0.0118   0.0121   0.0124   0.0126
   0.0116   0.0126   0.0133   0.0140   0.0145   0.0150   0.0152
   0.0133   0.0145   0.0155   0.0163   0.0170   0.0176   0.0180
   0.0151   0.0164   0.0176   0.0187   0.0196   0.0203   0.0209
   0.0168   0.0184   0.0199   0.0211   0.0222   0.0231   0.0238
   0.0187   0.0205   0.0222   0.0236   0.0249   0.0259   0.0268
```

Columns 22 through 28

```
-0.1134  -0.1121  -0.1109  -0.1098  -0.1088  -0.1079  -0.1071
-0.0579  -0.0509  -0.0440  -0.0371  -0.0302  -0.0234  -0.0166
   0.1098   0.1181   0.1255   0.1322   0.1380   0.1431   0.1473
-0.0041  -0.0021  -0.0003   0.0014   0.0030   0.0046   0.0060
-0.0062  -0.0044  -0.0028  -0.0012   0.0003   0.0017   0.0030
-0.0082  -0.0066  -0.0051  -0.0037  -0.0023  -0.0010   0.0002
-0.0102  -0.0087  -0.0074  -0.0060  -0.0048  -0.0036  -0.0025
-0.0120  -0.0108  -0.0095  -0.0083  -0.0072  -0.0061  -0.0050
-0.0138  -0.0127  -0.0116  -0.0105  -0.0095  -0.0085  -0.0075
-0.0155  -0.0145  -0.0135  -0.0126  -0.0117  -0.0108  -0.0099
-0.0171  -0.0162  -0.0154  -0.0146  -0.0138  -0.0130  -0.0122
-0.0186  -0.0179  -0.0172  -0.0165  -0.0157  -0.0150  -0.0143
-0.0200  -0.0194  -0.0188  -0.0182  -0.0176  -0.0170  -0.0164
-0.0213  -0.0209  -0.0204  -0.0199  -0.0194  -0.0189  -0.0183
-0.0226  -0.0222  -0.0219  -0.0215  -0.0211  -0.0206  -0.0201
-0.0237  -0.0235  -0.0233  -0.0230  -0.0226  -0.0223  -0.0218
-0.0248  -0.0247  -0.0245  -0.0243  -0.0241  -0.0238  -0.0235
-0.0258  -0.0258  -0.0257  -0.0256  -0.0254  -0.0252  -0.0250
-0.0267  -0.0268  -0.0268  -0.0268  -0.0267  -0.0266  -0.0263
-0.0275  -0.0277  -0.0278  -0.0279  -0.0278  -0.0278  -0.0276
-0.0282  -0.0285  -0.0287  -0.0288  -0.0289  -0.0289  -0.0288
   0.9712  -0.0292  -0.0295  -0.0297  -0.0298  -0.0299  -0.0299
-0.0294   0.9702  -0.0302  -0.0305  -0.0307  -0.0308  -0.0308
-0.0298  -0.0303   0.9692  -0.0311  -0.0314  -0.0316  -0.0317
```

-0.0302 -0.0308 -0.0313 0.9683 -0.0320 -0.0323 -0.0324
-0.0305 -0.0311 -0.0317 -0.0322 0.9675 -0.0328 -0.0330
-0.0306 -0.0314 -0.0320 -0.0325 -0.0330 0.9667 -0.0336
-0.0307 -0.0315 -0.0322 -0.0328 -0.0333 -0.0337 0.9660
-0.0308 -0.0316 -0.0323 -0.0330 -0.0335 -0.0339 -0.0343
-0.0307 -0.0316 -0.0323 -0.0330 -0.0336 -0.0341 -0.0345
-0.0305 -0.0314 -0.0323 -0.0330 -0.0336 -0.0341 -0.0345
-0.0303 -0.0312 -0.0321 -0.0328 -0.0335 -0.0341 -0.0345
-0.0299 -0.0309 -0.0318 -0.0326 -0.0333 -0.0339 -0.0344
-0.0295 -0.0305 -0.0314 -0.0323 -0.0330 -0.0336 -0.0341
-0.0290 -0.0300 -0.0310 -0.0318 -0.0326 -0.0332 -0.0338
-0.0284 -0.0294 -0.0304 -0.0313 -0.0321 -0.0327 -0.0333
-0.0277 -0.0288 -0.0297 -0.0306 -0.0314 -0.0321 -0.0327
-0.0269 -0.0280 -0.0290 -0.0299 -0.0307 -0.0314 -0.0321
-0.0260 -0.0271 -0.0281 -0.0290 -0.0299 -0.0306 -0.0313
-0.0251 -0.0262 -0.0272 -0.0281 -0.0289 -0.0297 -0.0304
-0.0240 -0.0251 -0.0261 -0.0270 -0.0279 -0.0287 -0.0294
-0.0229 -0.0240 -0.0250 -0.0259 -0.0268 -0.0275 -0.0283
-0.0217 -0.0227 -0.0237 -0.0247 -0.0255 -0.0263 -0.0270
-0.0203 -0.0214 -0.0224 -0.0233 -0.0242 -0.0250 -0.0257
-0.0189 -0.0200 -0.0209 -0.0218 -0.0227 -0.0235 -0.0242
-0.0175 -0.0185 -0.0194 -0.0203 -0.0211 -0.0219 -0.0227
-0.0159 -0.0168 -0.0178 -0.0186 -0.0195 -0.0203 -0.0210
-0.0142 -0.0151 -0.0160 -0.0169 -0.0177 -0.0185 -0.0193
-0.0125 -0.0133 -0.0142 -0.0150 -0.0158 -0.0166 -0.0174
-0.0106 -0.0115 -0.0123 -0.0131 -0.0139 -0.0146 -0.0154
-0.0087 -0.0095 -0.0103 -0.0110 -0.0118 -0.0125 -0.0133
-0.0067 -0.0074 -0.0081 -0.0089 -0.0096 -0.0103 -0.0111
-0.0046 -0.0052 -0.0059 -0.0066 -0.0073 -0.0080 -0.0088
-0.0024 -0.0030 -0.0036 -0.0042 -0.0049 -0.0056 -0.0064
-0.0001 -0.0006 -0.0012 -0.0018 -0.0024 -0.0031 -0.0038
0.0022 0.0018 0.0013 0.0008 0.0002 -0.0005 -0.0012
0.0047 0.0043 0.0039 0.0034 0.0029 0.0023 0.0016
0.0072 0.0070 0.0066 0.0062 0.0057 0.0051 0.0044
0.0099 0.0097 0.0094 0.0091 0.0086 0.0081 0.0074
0.0126 0.0125 0.0123 0.0120 0.0116 0.0111 0.0105
0.0154 0.0154 0.0153 0.0151 0.0148 0.0143 0.0137
0.0183 0.0184 0.0184 0.0183 0.0180 0.0175 0.0170
0.0213 0.0215 0.0216 0.0215 0.0213 0.0209 0.0204
0.0243 0.0247 0.0249 0.0249 0.0247 0.0244 0.0239
0.0275 0.0280 0.0283 0.0284 0.0283 0.0280 0.0275

Columns 29 through 35

-0.1063 -0.1057 -0.1051 -0.1046 -0.1042 -0.1039 -0.1036
-0.0098 -0.0031 0.0036 0.0103 0.0169 0.0235 0.0301
0.1507 0.1534 0.1552 0.1563 0.1565 0.1559 0.1546
0.0073 0.0085 0.0096 0.0106 0.0115 0.0123 0.0129
0.0043 0.0054 0.0065 0.0074 0.0083 0.0091 0.0098
0.0014 0.0025 0.0035 0.0044 0.0052 0.0060 0.0067
-0.0014 -0.0004 0.0006 0.0015 0.0023 0.0030 0.0037
-0.0041 -0.0031 -0.0022 -0.0014 -0.0006 0.0002 0.0009
-0.0066 -0.0057 -0.0049 -0.0041 -0.0033 -0.0026 -0.0019
-0.0091 -0.0082 -0.0074 -0.0067 -0.0059 -0.0052 -0.0045
-0.0114 -0.0106 -0.0099 -0.0091 -0.0084 -0.0077 -0.0070
-0.0136 -0.0129 -0.0122 -0.0115 -0.0108 -0.0101 -0.0094
-0.0157 -0.0151 -0.0144 -0.0138 -0.0131 -0.0124 -0.0117
-0.0177 -0.0171 -0.0165 -0.0159 -0.0153 -0.0146 -0.0139
-0.0196 -0.0191 -0.0185 -0.0179 -0.0173 -0.0167 -0.0160
-0.0214 -0.0209 -0.0204 -0.0199 -0.0193 -0.0186 -0.0180
-0.0231 -0.0226 -0.0222 -0.0217 -0.0211 -0.0205 -0.0199
-0.0246 -0.0243 -0.0238 -0.0234 -0.0228 -0.0222 -0.0216
-0.0261 -0.0258 -0.0254 -0.0249 -0.0244 -0.0239 -0.0233
-0.0274 -0.0272 -0.0268 -0.0264 -0.0259 -0.0254 -0.0248
-0.0287 -0.0284 -0.0281 -0.0278 -0.0273 -0.0268 -0.0262
-0.0298 -0.0296 -0.0293 -0.0290 -0.0286 -0.0281 -0.0276
-0.0308 -0.0306 -0.0304 -0.0301 -0.0298 -0.0293 -0.0288
-0.0317 -0.0316 -0.0314 -0.0312 -0.0308 -0.0304 -0.0299
-0.0325 -0.0324 -0.0323 -0.0321 -0.0318 -0.0314 -0.0309
-0.0331 -0.0331 -0.0331 -0.0329 -0.0326 -0.0322 -0.0318
-0.0337 -0.0337 -0.0337 -0.0336 -0.0333 -0.0330 -0.0325
-0.0342 -0.0342 -0.0342 -0.0341 -0.0339 -0.0336 -0.0332
0.9655 -0.0346 -0.0347 -0.0346 -0.0344 -0.0341 -0.0338
-0.0347 0.9651 -0.0350 -0.0349 -0.0348 -0.0346 -0.0342
-0.0348 -0.0351 0.9648 -0.0352 -0.0351 -0.0349 -0.0346
-0.0349 -0.0351 -0.0352 0.9647 -0.0352 -0.0351 -0.0348
-0.0348 -0.0350 -0.0352 -0.0353 0.9647 -0.0351 -0.0349
-0.0345 -0.0349 -0.0351 -0.0352 -0.0352 0.9649 -0.0349
-0.0342 -0.0346 -0.0348 -0.0350 -0.0350 -0.0350 0.9652
-0.0338 -0.0342 -0.0345 -0.0347 -0.0347 -0.0347 -0.0346
-0.0333 -0.0337 -0.0340 -0.0342 -0.0343 -0.0344 -0.0343
-0.0326 -0.0330 -0.0334 -0.0337 -0.0338 -0.0339 -0.0339
-0.0318 -0.0323 -0.0327 -0.0330 -0.0332 -0.0333 -0.0334
-0.0310 -0.0315 -0.0319 -0.0322 -0.0325 -0.0326 -0.0327
-0.0300 -0.0305 -0.0310 -0.0313 -0.0316 -0.0318 -0.0320
-0.0289 -0.0294 -0.0299 -0.0303 -0.0307 -0.0309 -0.0311
-0.0277 -0.0283 -0.0288 -0.0292 -0.0296 -0.0299 -0.0302
-0.0264 -0.0270 -0.0275 -0.0280 -0.0284 -0.0288 -0.0291
-0.0249 -0.0256 -0.0261 -0.0267 -0.0271 -0.0275 -0.0279
-0.0234 -0.0241 -0.0247 -0.0252 -0.0257 -0.0262 -0.0266
-0.0218 -0.0224 -0.0231 -0.0237 -0.0242 -0.0247 -0.0252
-0.0200 -0.0207 -0.0214 -0.0220 -0.0226 -0.0231 -0.0237
-0.0181 -0.0188 -0.0195 -0.0202 -0.0208 -0.0215 -0.0221
-0.0161 -0.0169 -0.0176 -0.0183 -0.0190 -0.0197 -0.0203
-0.0141 -0.0148 -0.0155 -0.0163 -0.0170 -0.0178 -0.0185
-0.0118 -0.0126 -0.0134 -0.0142 -0.0150 -0.0157 -0.0165
-0.0095 -0.0103 -0.0111 -0.0119 -0.0128 -0.0136 -0.0145
-0.0071 -0.0079 -0.0087 -0.0096 -0.0105 -0.0114 -0.0123
-0.0046 -0.0054 -0.0062 -0.0071 -0.0081 -0.0090 -0.0100
-0.0019 -0.0028 -0.0036 -0.0046 -0.0055 -0.0066 -0.0077
0.0008 -0.0000 -0.0009 -0.0019 -0.0029 -0.0040 -0.0052
0.0037 0.0028 0.0019 0.0009 -0.0002 -0.0013 -0.0026
0.0067 0.0058 0.0049 0.0038 0.0027 0.0015 0.0001
0.0097 0.0089 0.0079 0.0069 0.0057 0.0044 0.0030
0.0129 0.0121 0.0111 0.0100 0.0087 0.0074 0.0059

0.0163	0.0154	0.0144	0.0132	0.0119	0.0105	0.0089
0.0197	0.0188	0.0178	0.0166	0.0152	0.0137	0.0121
0.0232	0.0223	0.0213	0.0201	0.0187	0.0171	0.0153
0.0268	0.0260	0.0249	0.0236	0.0222	0.0205	0.0187

Columns 36 through 42

-0.1035	-0.1034	-0.1035	-0.1036	-0.1038	-0.1041	-0.1045
0.0366	0.0431	0.0496	0.0560	0.0624	0.0687	0.0751
0.1524	0.1494	0.1456	0.1411	0.1357	0.1295	0.1225
0.0135	0.0140	0.0144	0.0146	0.0148	0.0149	0.0148
0.0104	0.0109	0.0113	0.0116	0.0119	0.0120	0.0121
0.0073	0.0079	0.0083	0.0087	0.0090	0.0093	0.0095
0.0044	0.0050	0.0055	0.0059	0.0063	0.0066	0.0069
0.0015	0.0021	0.0027	0.0032	0.0037	0.0041	0.0044
-0.0012	-0.0006	0.0000	0.0006	0.0011	0.0016	0.0021
-0.0038	-0.0032	-0.0025	-0.0019	-0.0013	-0.0008	-0.0003
-0.0063	-0.0056	-0.0050	-0.0043	-0.0037	-0.0031	-0.0025
-0.0087	-0.0080	-0.0073	-0.0067	-0.0060	-0.0053	-0.0046
-0.0110	-0.0103	-0.0096	-0.0089	-0.0082	-0.0074	-0.0067
-0.0132	-0.0125	-0.0118	-0.0110	-0.0102	-0.0095	-0.0086
-0.0153	-0.0146	-0.0138	-0.0130	-0.0122	-0.0114	-0.0105
-0.0173	-0.0166	-0.0158	-0.0150	-0.0141	-0.0133	-0.0123
-0.0192	-0.0184	-0.0176	-0.0168	-0.0159	-0.0150	-0.0141
-0.0209	-0.0202	-0.0194	-0.0186	-0.0177	-0.0167	-0.0157
-0.0226	-0.0218	-0.0210	-0.0202	-0.0193	-0.0183	-0.0173
-0.0241	-0.0234	-0.0226	-0.0217	-0.0208	-0.0198	-0.0187
-0.0256	-0.0249	-0.0241	-0.0232	-0.0222	-0.0212	-0.0201
-0.0269	-0.0262	-0.0254	-0.0245	-0.0236	-0.0226	-0.0215
-0.0281	-0.0274	-0.0267	-0.0258	-0.0248	-0.0238	-0.0227
-0.0293	-0.0286	-0.0278	-0.0269	-0.0260	-0.0250	-0.0238
-0.0303	-0.0296	-0.0289	-0.0280	-0.0271	-0.0260	-0.0249
-0.0312	-0.0305	-0.0298	-0.0290	-0.0280	-0.0270	-0.0259
-0.0320	-0.0314	-0.0306	-0.0298	-0.0289	-0.0279	-0.0268
-0.0327	-0.0321	-0.0314	-0.0306	-0.0297	-0.0287	-0.0276
-0.0333	-0.0327	-0.0320	-0.0313	-0.0304	-0.0294	-0.0283
-0.0338	-0.0332	-0.0326	-0.0318	-0.0310	-0.0300	-0.0290
-0.0341	-0.0336	-0.0330	-0.0323	-0.0315	-0.0306	-0.0295
-0.0344	-0.0339	-0.0334	-0.0327	-0.0319	-0.0310	-0.0300
-0.0346	-0.0341	-0.0336	-0.0330	-0.0322	-0.0314	-0.0304
-0.0346	-0.0342	-0.0337	-0.0331	-0.0324	-0.0316	-0.0307
-0.0346	-0.0342	-0.0338	-0.0332	-0.0326	-0.0318	-0.0310
0.9656	-0.0341	-0.0337	-0.0332	-0.0326	-0.0319	-0.0311
-0.0342	0.9661	-0.0336	-0.0331	-0.0326	-0.0319	-0.0312
-0.0338	-0.0336	0.9667	-0.0329	-0.0324	-0.0319	-0.0312
-0.0333	-0.0332	-0.0329	0.9674	-0.0322	-0.0317	-0.0311
-0.0327	-0.0326	-0.0325	-0.0322	0.9681	-0.0314	-0.0309
-0.0320	-0.0320	-0.0319	-0.0317	-0.0314	0.9689	-0.0307
-0.0312	-0.0313	-0.0312	-0.0311	-0.0309	-0.0307	0.9697
-0.0303	-0.0304	-0.0305	-0.0304	-0.0303	-0.0301	-0.0299
-0.0293	-0.0295	-0.0296	-0.0296	-0.0296	-0.0295	-0.0294
-0.0282	-0.0284	-0.0286	-0.0287	-0.0288	-0.0288	-0.0288
-0.0270	-0.0273	-0.0275	-0.0278	-0.0279	-0.0281	-0.0281
-0.0256	-0.0260	-0.0264	-0.0267	-0.0270	-0.0272	-0.0274
-0.0242	-0.0247	-0.0251	-0.0255	-0.0259	-0.0262	-0.0265
-0.0226	-0.0232	-0.0237	-0.0242	-0.0247	-0.0252	-0.0256
-0.0210	-0.0216	-0.0222	-0.0229	-0.0235	-0.0240	-0.0246
-0.0192	-0.0199	-0.0207	-0.0214	-0.0221	-0.0228	-0.0235
-0.0174	-0.0182	-0.0190	-0.0198	-0.0207	-0.0215	-0.0224
-0.0154	-0.0163	-0.0172	-0.0182	-0.0191	-0.0201	-0.0211
-0.0133	-0.0143	-0.0153	-0.0164	-0.0175	-0.0186	-0.0198
-0.0111	-0.0122	-0.0134	-0.0145	-0.0158	-0.0170	-0.0183
-0.0088	-0.0100	-0.0113	-0.0126	-0.0139	-0.0154	-0.0168
-0.0064	-0.0077	-0.0091	-0.0105	-0.0120	-0.0136	-0.0153
-0.0039	-0.0053	-0.0068	-0.0084	-0.0100	-0.0118	-0.0136
-0.0013	-0.0028	-0.0044	-0.0061	-0.0079	-0.0098	-0.0119
0.0014	-0.0002	-0.0019	-0.0038	-0.0058	-0.0078	-0.0100
0.0043	0.0025	0.0007	-0.0013	-0.0035	-0.0057	-0.0081
0.0072	0.0053	0.0033	0.0012	-0.0011	-0.0035	-0.0061
0.0103	0.0083	0.0061	0.0038	0.0014	-0.0013	-0.0040
0.0134	0.0113	0.0090	0.0066	0.0039	0.0011	-0.0019
0.0167	0.0144	0.0120	0.0094	0.0066	0.0036	0.0004

Columns 43 through 49

-0.1050	-0.1055	-0.1062	-0.1069	-0.1077	-0.1086	-0.1096
0.0814	0.0876	0.0938	0.1000	0.1062	0.1123	0.1184
0.1148	0.1062	0.0968	0.0866	0.0756	0.0638	0.0513
0.0147	0.0144	0.0141	0.0136	0.0130	0.0124	0.0116
0.0121	0.0120	0.0118	0.0115	0.0111	0.0106	0.0100
0.0096	0.0096	0.0095	0.0094	0.0092	0.0089	0.0085
0.0071	0.0073	0.0073	0.0074	0.0073	0.0072	0.0071
0.0048	0.0050	0.0052	0.0054	0.0055	0.0056	0.0056
0.0025	0.0028	0.0032	0.0035	0.0038	0.0040	0.0042
0.0003	0.0007	0.0012	0.0016	0.0020	0.0024	0.0028
-0.0019	-0.0013	-0.0007	-0.0002	0.0004	0.0009	0.0014
-0.0039	-0.0033	-0.0026	-0.0019	-0.0012	-0.0006	0.0001
-0.0059	-0.0051	-0.0044	-0.0036	-0.0028	-0.0020	-0.0012
-0.0078	-0.0070	-0.0061	-0.0052	-0.0043	-0.0034	-0.0025
-0.0096	-0.0087	-0.0078	-0.0068	-0.0058	-0.0048	-0.0037
-0.0114	-0.0104	-0.0094	-0.0083	-0.0072	-0.0061	-0.0049
-0.0131	-0.0120	-0.0109	-0.0098	-0.0086	-0.0074	-0.0061
-0.0147	-0.0136	-0.0124	-0.0112	-0.0099	-0.0086	-0.0073
-0.0162	-0.0150	-0.0138	-0.0125	-0.0112	-0.0098	-0.0084
-0.0176	-0.0164	-0.0152	-0.0138	-0.0124	-0.0110	-0.0095
-0.0190	-0.0178	-0.0165	-0.0151	-0.0136	-0.0121	-0.0105
-0.0203	-0.0190	-0.0177	-0.0163	-0.0148	-0.0132	-0.0116
-0.0215	-0.0202	-0.0188	-0.0174	-0.0159	-0.0143	-0.0126
-0.0226	-0.0213	-0.0199	-0.0185	-0.0169	-0.0153	-0.0135
-0.0237	-0.0224	-0.0210	-0.0195	-0.0179	-0.0162	-0.0145
-0.0247	-0.0233	-0.0219	-0.0204	-0.0188	-0.0172	-0.0154
-0.0256	-0.0243	-0.0228	-0.0213	-0.0197	-0.0181	-0.0163
-0.0264	-0.0251	-0.0237	-0.0222	-0.0206	-0.0189	-0.0171
-0.0271	-0.0259	-0.0245	-0.0230	-0.0214	-0.0197	-0.0179
-0.0278	-0.0266	-0.0252	-0.0237	-0.0222	-0.0205	-0.0187

-0.0284 -0.0272 -0.0258 -0.0244 -0.0229 -0.0212 -0.0195
-0.0289 -0.0277 -0.0264 -0.0250 -0.0235 -0.0219 -0.0202
-0.0294 -0.0282 -0.0270 -0.0256 -0.0241 -0.0226 -0.0209
-0.0297 -0.0286 -0.0274 -0.0261 -0.0247 -0.0232 -0.0216
-0.0300 -0.0290 -0.0278 -0.0266 -0.0252 -0.0238 -0.0222
-0.0302 -0.0293 -0.0282 -0.0270 -0.0257 -0.0243 -0.0228
-0.0304 -0.0295 -0.0284 -0.0273 -0.0261 -0.0248 -0.0234
-0.0304 -0.0296 -0.0287 -0.0276 -0.0265 -0.0253 -0.0240
-0.0304 -0.0297 -0.0288 -0.0279 -0.0268 -0.0257 -0.0245
-0.0303 -0.0296 -0.0289 -0.0280 -0.0271 -0.0261 -0.0250
-0.0302 -0.0296 -0.0289 -0.0282 -0.0273 -0.0264 -0.0254
-0.0299 -0.0294 -0.0289 -0.0282 -0.0275 -0.0267 -0.0259
0.9704 -0.0292 -0.0288 -0.0282 -0.0276 -0.0270 -0.0263
-0.0292 0.9711 -0.0286 -0.0282 -0.0277 -0.0272 -0.0266
-0.0287 -0.0286 0.9716 -0.0281 -0.0278 -0.0274 -0.0270
-0.0282 -0.0281 -0.0281 0.9721 -0.0278 -0.0275 -0.0273
-0.0275 -0.0276 -0.0277 -0.0277 0.9723 -0.0277 -0.0276
-0.0268 -0.0271 -0.0273 -0.0275 -0.0276 0.9723 -0.0278
-0.0260 -0.0264 -0.0268 -0.0271 -0.0275 -0.0278 0.9720
-0.0252 -0.0257 -0.0262 -0.0268 -0.0273 -0.0277 -0.0282
-0.0242 -0.0249 -0.0256 -0.0263 -0.0270 -0.0277 -0.0284
-0.0232 -0.0241 -0.0249 -0.0258 -0.0267 -0.0276 -0.0285
-0.0221 -0.0232 -0.0242 -0.0253 -0.0264 -0.0275 -0.0286
-0.0209 -0.0222 -0.0234 -0.0247 -0.0260 -0.0273 -0.0287
-0.0197 -0.0211 -0.0225 -0.0240 -0.0255 -0.0271 -0.0287
-0.0184 -0.0200 -0.0216 -0.0233 -0.0251 -0.0269 -0.0287
-0.0170 -0.0188 -0.0206 -0.0225 -0.0245 -0.0266 -0.0287
-0.0155 -0.0175 -0.0196 -0.0217 -0.0239 -0.0263 -0.0287
-0.0140 -0.0161 -0.0184 -0.0208 -0.0233 -0.0259 -0.0286
-0.0123 -0.0147 -0.0173 -0.0199 -0.0226 -0.0255 -0.0285
-0.0106 -0.0132 -0.0160 -0.0189 -0.0219 -0.0251 -0.0283
-0.0088 -0.0117 -0.0147 -0.0178 -0.0211 -0.0246 -0.0282
-0.0070 -0.0101 -0.0133 -0.0167 -0.0203 -0.0241 -0.0280
-0.0050 -0.0084 -0.0119 -0.0156 -0.0195 -0.0235 -0.0277
-0.0030 -0.0066 -0.0104 -0.0144 -0.0185 -0.0229 -0.0275

Columns 50 through 56

-0.1107 -0.1118 -0.1131 -0.1144 -0.1159 -0.1174 -0.1190
0.1244 0.1305 0.1364 0.1424 0.1483 0.1542 0.1600
0.0379 0.0237 0.0087 -0.0071 -0.0237 -0.0411 -0.0593
0.0107 0.0097 0.0086 0.0074 0.0062 0.0048 0.0033
0.0094 0.0087 0.0078 0.0069 0.0059 0.0048 0.0036
0.0081 0.0076 0.0070 0.0063 0.0056 0.0048 0.0039
0.0068 0.0065 0.0062 0.0058 0.0053 0.0048 0.0042
0.0056 0.0055 0.0054 0.0052 0.0050 0.0047 0.0044
0.0043 0.0045 0.0045 0.0046 0.0046 0.0046 0.0045
0.0031 0.0034 0.0037 0.0040 0.0042 0.0044 0.0046
0.0019 0.0024 0.0029 0.0034 0.0038 0.0043 0.0047
0.0008 0.0014 0.0021 0.0027 0.0034 0.0041 0.0047
-0.0004 0.0004 0.0013 0.0021 0.0030 0.0038 0.0047
-0.0015 -0.0005 0.0004 0.0015 0.0025 0.0035 0.0046
-0.0026 -0.0015 -0.0004 0.0008 0.0020 0.0032 0.0045
-0.0037 -0.0025 -0.0012 0.0001 0.0015 0.0028 0.0043
-0.0048 -0.0034 -0.0020 -0.0006 0.0009 0.0025 0.0040
-0.0058 -0.0044 -0.0029 -0.0013 0.0003 0.0020 0.0038
-0.0069 -0.0053 -0.0037 -0.0020 -0.0002 0.0016 0.0034
-0.0079 -0.0062 -0.0045 -0.0027 -0.0009 0.0011 0.0030
-0.0089 -0.0071 -0.0053 -0.0035 -0.0015 0.0005 0.0026
-0.0098 -0.0080 -0.0062 -0.0042 -0.0022 -0.0001 0.0021
-0.0108 -0.0089 -0.0070 -0.0050 -0.0029 -0.0007 0.0016
-0.0117 -0.0098 -0.0078 -0.0057 -0.0036 -0.0013 0.0010
-0.0126 -0.0107 -0.0086 -0.0065 -0.0043 -0.0020 0.0004
-0.0135 -0.0115 -0.0095 -0.0073 -0.0051 -0.0027 -0.0003
-0.0144 -0.0124 -0.0103 -0.0081 -0.0058 -0.0035 -0.0010
-0.0152 -0.0132 -0.0111 -0.0089 -0.0067 -0.0043 -0.0018
-0.0160 -0.0141 -0.0120 -0.0098 -0.0075 -0.0051 -0.0026
-0.0168 -0.0149 -0.0128 -0.0106 -0.0083 -0.0060 -0.0035
-0.0176 -0.0157 -0.0136 -0.0115 -0.0092 -0.0069 -0.0044
-0.0184 -0.0165 -0.0145 -0.0123 -0.0101 -0.0078 -0.0054
-0.0191 -0.0173 -0.0153 -0.0132 -0.0110 -0.0088 -0.0064
-0.0199 -0.0180 -0.0161 -0.0141 -0.0120 -0.0098 -0.0074
-0.0206 -0.0188 -0.0170 -0.0150 -0.0130 -0.0108 -0.0086
-0.0213 -0.0196 -0.0178 -0.0159 -0.0140 -0.0119 -0.0097
-0.0219 -0.0203 -0.0186 -0.0169 -0.0150 -0.0130 -0.0109
-0.0226 -0.0211 -0.0195 -0.0178 -0.0160 -0.0142 -0.0122
-0.0232 -0.0218 -0.0203 -0.0187 -0.0171 -0.0153 -0.0135
-0.0238 -0.0225 -0.0212 -0.0197 -0.0182 -0.0166 -0.0149
-0.0244 -0.0232 -0.0220 -0.0207 -0.0193 -0.0178 -0.0163
-0.0249 -0.0239 -0.0228 -0.0217 -0.0204 -0.0191 -0.0177
-0.0255 -0.0246 -0.0237 -0.0227 -0.0216 -0.0205 -0.0192
-0.0260 -0.0253 -0.0245 -0.0237 -0.0228 -0.0218 -0.0208
-0.0265 -0.0259 -0.0253 -0.0247 -0.0240 -0.0232 -0.0224
-0.0270 -0.0266 -0.0262 -0.0257 -0.0252 -0.0247 -0.0241
-0.0274 -0.0273 -0.0270 -0.0268 -0.0265 -0.0261 -0.0258
-0.0279 -0.0279 -0.0279 -0.0278 -0.0278 -0.0277 -0.0275
-0.0283 -0.0285 -0.0287 -0.0289 -0.0291 -0.0292 -0.0293
0.9713 -0.0291 -0.0296 -0.0300 -0.0304 -0.0308 -0.0312
-0.0291 0.9703 -0.0304 -0.0311 -0.0317 -0.0324 -0.0331
-0.0294 -0.0303 0.9687 -0.0322 -0.0331 -0.0341 -0.0350
-0.0298 -0.0309 -0.0321 0.9667 -0.0345 -0.0358 -0.0370
-0.0301 -0.0315 -0.0329 -0.0344 0.9641 -0.0375 -0.0391
-0.0304 -0.0321 -0.0338 -0.0356 -0.0374 0.9607 -0.0412
-0.0306 -0.0326 -0.0346 -0.0367 -0.0389 -0.0411 0.9567
-0.0309 -0.0332 -0.0355 -0.0379 -0.0404 -0.0429 -0.0455
-0.0311 -0.0337 -0.0363 -0.0391 -0.0419 -0.0448 -0.0477
-0.0314 -0.0342 -0.0372 -0.0403 -0.0434 -0.0467 -0.0500
-0.0315 -0.0347 -0.0380 -0.0415 -0.0450 -0.0486 -0.0524
-0.0317 -0.0352 -0.0389 -0.0427 -0.0466 -0.0506 -0.0548
-0.0319 -0.0357 -0.0397 -0.0439 -0.0482 -0.0526 -0.0572
-0.0320 -0.0362 -0.0406 -0.0451 -0.0498 -0.0547 -0.0597
-0.0321 -0.0367 -0.0414 -0.0464 -0.0515 -0.0568 -0.0622
-0.0322 -0.0372 -0.0423 -0.0476 -0.0532 -0.0589 -0.0648

Columns 57 through 63

-0.1207 -0.1225 -0.1243 -0.1263 -0.1283 -0.1304 -0.1327
0.1659 0.1716 0.1774 0.1831 0.1888 0.1944 0.2000
-0.0783 -0.0981 -0.1187 -0.1401 -0.1623 -0.1853 -0.2091
0.0016 -0.0001 -0.0019 -0.0038 -0.0058 -0.0080 -0.0102
0.0023 0.0010 -0.0005 -0.0020 -0.0037 -0.0054 -0.0072
0.0029 0.0019 0.0008 -0.0004 -0.0017 -0.0030 -0.0044
0.0035 0.0028 0.0020 0.0012 0.0003 -0.0007 -0.0017
0.0040 0.0036 0.0031 0.0026 0.0020 0.0014 0.0008
0.0044 0.0043 0.0041 0.0039 0.0037 0.0034 0.0031
0.0048 0.0050 0.0051 0.0052 0.0052 0.0053 0.0053
0.0051 0.0055 0.0059 0.0063 0.0067 0.0070 0.0073
0.0054 0.0060 0.0067 0.0073 0.0080 0.0086 0.0092
0.0055 0.0064 0.0073 0.0082 0.0091 0.0100 0.0110
0.0057 0.0068 0.0079 0.0090 0.0102 0.0114 0.0125
0.0057 0.0070 0.0084 0.0097 0.0111 0.0125 0.0140
0.0057 0.0072 0.0088 0.0103 0.0119 0.0136 0.0152
0.0057 0.0073 0.0090 0.0108 0.0126 0.0145 0.0164
0.0055 0.0074 0.0092 0.0112 0.0132 0.0152 0.0173
0.0053 0.0073 0.0094 0.0115 0.0136 0.0158 0.0181
0.0051 0.0072 0.0094 0.0116 0.0139 0.0163 0.0188
0.0048 0.0070 0.0093 0.0117 0.0141 0.0167 0.0193
0.0044 0.0067 0.0092 0.0117 0.0142 0.0169 0.0196
0.0040 0.0064 0.0089 0.0115 0.0142 0.0170 0.0198
0.0035 0.0060 0.0086 0.0113 0.0140 0.0169 0.0198
0.0029 0.0055 0.0081 0.0109 0.0137 0.0167 0.0197
0.0023 0.0049 0.0076 0.0104 0.0133 0.0163 0.0194
0.0016 0.0042 0.0070 0.0099 0.0128 0.0159 0.0190
0.0008 0.0035 0.0063 0.0092 0.0122 0.0152 0.0184
0.0000 0.0027 0.0055 0.0084 0.0114 0.0145 0.0177
-0.0009 0.0018 0.0046 0.0075 0.0105 0.0136 0.0168
-0.0018 0.0009 0.0036 0.0065 0.0095 0.0126 0.0158
-0.0028 -0.0002 0.0026 0.0054 0.0083 0.0114 0.0146
-0.0039 -0.0013 0.0014 0.0042 0.0071 0.0101 0.0132
-0.0050 -0.0025 0.0001 0.0029 0.0057 0.0086 0.0117
-0.0062 -0.0037 -0.0012 0.0015 0.0042 0.0071 0.0100
-0.0075 -0.0051 -0.0026 -0.0001 0.0026 0.0053 0.0082
-0.0088 -0.0065 -0.0041 -0.0017 0.0009 0.0035 0.0062
-0.0101 -0.0080 -0.0058 -0.0034 -0.0010 0.0015 0.0041
-0.0116 -0.0096 -0.0075 -0.0053 -0.0030 -0.0006 0.0018
-0.0131 -0.0112 -0.0093 -0.0072 -0.0051 -0.0029 -0.0006
-0.0146 -0.0129 -0.0112 -0.0093 -0.0073 -0.0053 -0.0032
-0.0163 -0.0147 -0.0131 -0.0114 -0.0097 -0.0079 -0.0059
-0.0180 -0.0166 -0.0152 -0.0137 -0.0122 -0.0105 -0.0088
-0.0197 -0.0186 -0.0174 -0.0161 -0.0148 -0.0134 -0.0119
-0.0215 -0.0206 -0.0196 -0.0186 -0.0175 -0.0163 -0.0151
-0.0234 -0.0227 -0.0220 -0.0212 -0.0203 -0.0194 -0.0185
-0.0253 -0.0249 -0.0244 -0.0238 -0.0233 -0.0226 -0.0220
-0.0273 -0.0271 -0.0269 -0.0266 -0.0263 -0.0260 -0.0257
-0.0294 -0.0295 -0.0295 -0.0295 -0.0295 -0.0295 -0.0295
-0.0315 -0.0319 -0.0322 -0.0326 -0.0329 -0.0332 -0.0335
-0.0337 -0.0344 -0.0350 -0.0357 -0.0363 -0.0370 -0.0376
-0.0360 -0.0369 -0.0379 -0.0389 -0.0399 -0.0409 -0.0419
-0.0383 -0.0396 -0.0409 -0.0422 -0.0436 -0.0449 -0.0463
-0.0407 -0.0423 -0.0440 -0.0457 -0.0474 -0.0491 -0.0509
-0.0431 -0.0451 -0.0471 -0.0492 -0.0513 -0.0535 -0.0557
-0.0456 -0.0480 -0.0504 -0.0528 -0.0554 -0.0579 -0.0606
0.9518 -0.0509 -0.0537 -0.0566 -0.0595 -0.0625 -0.0656
-0.0508 0.9461 -0.0571 -0.0604 -0.0638 -0.0673 -0.0708
-0.0535 -0.0570 0.9393 -0.0644 -0.0682 -0.0722 -0.0762
-0.0562 -0.0602 -0.0643 0.9315 -0.0728 -0.0772 -0.0817
-0.0590 -0.0635 -0.0680 -0.0727 0.9226 -0.0824 -0.0874
-0.0619 -0.0668 -0.0718 -0.0769 -0.0822 0.9123 -0.0932
-0.0649 -0.0702 -0.0757 -0.0813 -0.0871 -0.0931 0.9008
-0.0679 -0.0737 -0.0797 -0.0858 -0.0922 -0.0987 -0.1054
-0.0709 -0.0772 -0.0837 -0.0904 -0.0973 -0.1044 -0.1117

Columns 64 through 65

-0.1350 -0.1373
0.2056 0.2111
-0.2337 -0.2592
-0.0125 -0.0150
-0.0091 -0.0111
-0.0059 -0.0075
-0.0028 -0.0040
0.0000 -0.0007
0.0028 0.0024
0.0053 0.0053
0.0077 0.0080
0.0099 0.0105
0.0119 0.0128
0.0138 0.0150
0.0154 0.0169
0.0169 0.0187
0.0183 0.0203
0.0195 0.0217
0.0205 0.0228
0.0213 0.0239
0.0219 0.0247
0.0224 0.0253
0.0227 0.0257
0.0229 0.0260
0.0228 0.0260
0.0226 0.0259
0.0223 0.0256
0.0217 0.0251
0.0210 0.0244
0.0201 0.0235
0.0190 0.0224
0.0178 0.0212
0.0164 0.0197
0.0148 0.0181
0.0131 0.0162
0.0112 0.0142

```
    0.0091    0.0120
    0.0068    0.0096
    0.0044    0.0070
    0.0018    0.0042
-0.0010    0.0013
-0.0040   -0.0019
-0.0071   -0.0052
-0.0104   -0.0088
-0.0138   -0.0125
-0.0175   -0.0164
-0.0213   -0.0205
-0.0253   -0.0248
-0.0294   -0.0293
-0.0337   -0.0340
-0.0382   -0.0388
-0.0429   -0.0439
-0.0477   -0.0491
-0.0527   -0.0546
-0.0579   -0.0602
-0.0633   -0.0660
-0.0688   -0.0720
-0.0745   -0.0782
-0.0803   -0.0846
-0.0864   -0.0911
-0.0926   -0.0979
-0.0990   -0.1048
-0.1055   -0.1120
    0.8878   -0.1193
-0.1191    0.8732
```

```
V =

-0.82228   0.55354  -0.13212
-0.46421  -0.51811   0.71838
-0.32920  -0.65204  -0.68299
```

OSSERVAZIONI

Si nota che la matrice V ha dimensione 3 (in accordo con la matrice nucleo V), mentre la matrice Vt ha dimensione 65. Si nota inoltre che i vettori colonna, a partire dal terzo in poi (nella matrice Vt) sono identici alla matrice nucleo di At. Ciò si spiega facendo riferimento alla definizione di nucleo: quest'ultimo rappresenta infatti l'insieme dei vettori per cui una funzione lineare f(x)=0, vale a dire che l'immagine (f(x)) di ogni vettore appartenente al nucleo è il vettore nullo.

Esercizio 2

--Calcolare i valori singolari

Di seguito i risultati ottenuti:

```
per n=1 --->

    svdA0 =

         1    0    0    0
         0    0    0    0
         0    0    0    0
         0    0    0    0

per n=2 --->

    svdA1 =

       1.6180         0         0         0
            0    0.6180         0         0
            0         0         0         0
            0         0         0         0

per n=3 --->

    svdA2 =

       1.8794         0         0         0
            0    1.5321         0         0
            0         0    0.3473         0
            0         0         0         0

per n=4 --->

    svdA3 =

       2.2631         0         0         0
            0    1.5962         0         0
            0         0    1.5157         0
            0         0         0    0.1826
```

OSSERVAZIONI

Si nota che solo l'ultima matrice ha tutte le colonne non nulle, cioè ha tutti gli svd > 0.

--- Studiare l’andamento, rispetto ad n, del valore singolare massimo, del valore singolare minimo e del condizionamento in norma 2

Di seguito i risultati ottenuti:

```
per n=1 --->

    maxsvdA0 = 1                    minsvdA0 = 0

    normadueAtA0 = Inf

per n=2 --->

    maxsvdA1 = 1.6180               minsvdA1 = 0

    normadueAtA1 = Inf

per n=3 --->

    maxsvdA2 = 1.8794               minsvdA2 = 0

    normadueAtA2 = Inf

per n=4 --->

    maxsvdA3 = 2.2631               minsvdA3 = 0.1826

    normadueAtA3 = 12.3906
```

OSSERVAZIONI

Si nota che i primi 3 risultati del condizionamento in norma due sono pari ad inf, in quanto il minimo valore (svd) è zero e quindi un numero diviso zero ritorna come risultato infinito.

---Perturbare l’elemento b(n,1) della quantità −2^(2−n) e calcolare gli autovalori (funzione “eig”, si noti che la perturbazione dipende dalla dimensione della matrice).

Di seguito i risultati ottenuti:

```
per n=1 --->

    autovalA0p =

        -1
         0
         0
         0

per n=2 --->

    autovalA1p =

        -1.4142
         0
         0
         1.4142

per n=3 --->

    autovalA2p =

        -1.6399
         1.3200 + 0.2950i
         1.3200 - 0.2950i
         0


per n=4 --->

    autovalA3p =

        -1.7729
         1.2018 + 0.4510i
         1.2018 - 0.4510i
         1.3694
```

OSSERVAZIONI

Si nota che all'aumentare di n, aumentano anche gli autovalori, e che soltanto nel caso n=4 gli autovalori sono tutti non nulli.

-- Osservando che un autovalore diventa quasi nullo, fare considerazioni legate ai valori singolari ed al rango della matrice B

L'autovalore minore si ha con n=1. Anche per quanto riguarda i valori singolari, questi ultimi sono i più piccoli: guardando la matrice 4x4 degli svd si nota infatti che è composta da un solo elemento (pari ad uno) sulla prima riga/prima colonna e il resto degli elementi è nullo.

Studiando il determinante della matrice in questione si verifica inoltre che il rango della matrice di partenza A è uguale a quello della matrice Σ degli svd. In particolare si osserva che il rango di Σ dipende dai valori singolari ed è proprio uguale al numero di valori singolari diversi da zero.

Esercizio 3

--- Si determini la soluzione ai minimi quadrati del sistema Ac=y

-----Per mezzo della decomposizione ai valori singolari calcolata all'es. 1

```
r0 =

100.44353
  8.56396
  0.22166
```

-----Per mezzo della decomposizione QR (funzione "qr")

```
r1 =

-76.193666  -42.628274  -30.097977  -38.855820
  0.433107   -6.632978   -6.971607   -5.596319
  0.290959    0.735602    0.251213   -0.059983
```

-----Per mezzo delle equazioni normali AtAc=Aty

```
r2 =

 1.92108   1.09888   0.78417
```

-----Per mezzo del comando Matlab c=A\y

```
r3 =

 -0.0081594
  1.0946761
 -0.2387746
```

OSSERVAZIONI

Si nota che nella decomposizione a valori singolari otteniamo tutti valori positivi, come anche nel caso delle equazioni normali AtAc=Aty , con la differenza che con questo metodo si ottengono valori decisamente maggiori.
Il metodo QR e il comando di matlab c=A\y, invece, ci restituiscono entrambi valori negativi.
Anche in questo caso uno dei due (metodo QR) ci ritorna valori molto più piccoli.