Test for Gaussian elimination and solvers

```
%Define a random matrix and check that is non-singular with the
 condition
%number of A
A=zeros(20,20);
tol=100;
i=1;
%The following loop will redefine the matrix A until one of them has a
%condition number below tol.
while cond(A)>tol
A=rand(20); %Redefine A
i=i+1;      %Count how many tries
end
A
i
b=rand(20,1)
%We proceed with the Gaussian Elimination with Partial Pivoting.
[L,U,piv]=GEpiv(A)
%Then we obtain PA=A(piv,:), L and U, where PA=LU
A(piv,:)
L*U
%Observe that they are equal
%We are going to solve the following system: PAx=LUx=Pb, where
 Pb=b(piv).
%We start with the following: Lz=Pb, z=Ux.
z=Ltrisol(L,b(piv))
%Obtained z, we now calculate the solution x
x=Utrisol(U,z)
%Calculate the residue vector
r=b(piv)-A(piv,:)*x
%Calculate two norms of the residue vector
N1=norm(r,1)
N2=norm(r,2)

% About the row interchanges, the information is given by the vector
 piv.
```

```
A =

  Columns 1 through 7

    0.7890    0.5965    0.6131    0.2629    0.8841    0.7386    0.6366
    0.7744    0.2395    0.6565    0.4241    0.7346    0.2647    0.6778
    0.1901    0.9098    0.2855    0.1459    0.7702    0.4528    0.9734
    0.7428    0.7740    0.9430    0.0834    0.4128    0.9326    0.6976
    0.0276    0.6960    0.9409    0.7455    0.8018    0.6600    0.3758
    0.9291    0.7302    0.6883    0.0291    0.8269    0.3836    0.5081
    0.2393    0.3673    0.4503    0.6064    0.0705    0.4570    0.3758
    0.7255    0.9082    0.6915    0.1377    0.0709    0.5867    0.1724
    0.6934    0.9470    0.2201    0.0425    0.7664    0.1590    0.3993
```

```
    0.4937    0.4158    0.9855    0.3711    0.4603    0.9196    0.9223
    0.0309    0.6935    0.2397    0.7380    0.3664    0.7962    0.3695
    0.5046    0.7065    0.7412    0.6862    0.7158    0.1481    0.6890
    0.8918    0.0828    0.1268    0.6470    0.6401    0.3996    0.7997
    0.9787    0.1013    0.7459    0.3518    0.8869    0.0632    0.0447
    0.3957    0.3280    0.9077    0.2617    0.7077    0.1860    0.9383
    0.8929    0.5261    0.0477    0.4905    0.1270    0.8545    0.0499
    0.8315    0.1665    0.3363    0.6790    0.0967    0.5432    0.6146
    0.3322    0.1231    0.8889    0.8811    0.0932    0.4304    0.0869
    0.0415    0.3986    0.0034    0.0861    0.9026    0.4219    0.0508
    0.9661    0.6580    0.6814    0.3658    0.0902    0.2089    0.7651

Columns 8 through 14

    0.0388    0.7864    0.8387    0.1606    0.9184    0.0206    0.0199
    0.3879    0.2746    0.7095    0.9109    0.8577    0.3415    0.7313
    0.3278    0.8985    0.5748    0.1869    0.1515    0.0140    0.1597
    0.9236    0.3065    0.4061    0.2534    0.6289    0.3821    0.2462
    0.6720    0.8511    0.6005    0.9198    0.0481    0.2381    0.9522
    0.0976    0.8074    0.3011    0.8973    0.7750    0.8085    0.2164
    0.6728    0.4944    0.5174    0.4433    0.2508    0.5523    0.4740
    0.3904    0.4158    0.4289    0.6372    0.4232    0.5088    0.7661
    0.8889    0.8819    0.3731    0.5436    0.7323    0.4627    0.3842
    0.4560    0.4848    0.8103    0.5374    0.8510    0.5345    0.5654
    0.5687    0.8717    0.5836    0.3001    0.4008    0.9273    0.1058
    0.4438    0.1246    0.4417    0.5000    0.4710    0.4688    0.6939
    0.2630    0.9540    0.3059    0.9602    0.1496    0.9604    0.9112
    0.7030    0.9345    0.6755    0.6615    0.7345    0.8642    0.2094
    0.3494    0.7688    0.2283    0.9478    0.0735    0.6384    0.9691
    0.5966    0.5195    0.8501    0.7148    0.5806    0.1245    0.0903
    0.5286    0.1100    0.9752    0.7167    0.2275    0.2161    0.1068
    0.7615    0.7285    0.6128    0.8856    0.4885    0.8829    0.0778
    0.8506    0.8409    0.7446    0.0688    0.1508    0.9579    0.5428
    0.9624    0.4256    0.7716    0.5412    0.9387    0.1198    0.8527

Columns 15 through 20

    0.3123    0.9008    0.3597    0.0793    0.3221    0.4032
    0.8039    0.0981    0.8399    0.1733    0.9021    0.8560
    0.0741    0.8181    0.5949    0.3901    0.3350    0.1194
    0.1334    0.2337    0.5697    0.9838    0.2871    0.7819
    0.1517    0.6117    0.9931    0.4385    0.4587    0.2263
    0.8125    0.2151    0.9808    0.6382    0.8898    0.2880
    0.7856    0.8930    0.6132    0.5575    0.2089    0.0950
    0.1104    0.2159    0.8694    0.0957    0.8928    0.3521
    0.6581    0.2675    0.6658    0.9891    0.2139    0.5294
    0.0467    0.4617    0.8198    0.2967    0.3321    0.6841
    0.3366    0.3201    0.5328    0.9716    0.1067    0.9110
    0.4787    0.2353    0.8042    0.0216    0.3982    0.2528
    0.0970    0.3042    0.8078    0.0313    0.2384    0.0360
    0.5807    0.7792    0.8646    0.9663    0.9775    0.2637
    0.6617    0.6330    0.9480    0.7011    0.7369    0.5181
    0.4056    0.9197    0.1909    0.9438    0.6061    0.6551
    0.8415    0.6272    0.1674    0.3092    0.3222    0.8350
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```
    0.3671    0.8444    0.4057    0.0566    0.2898    0.3228
    0.9796    0.5898    0.3688    0.8428    0.5066    0.1427
    0.7742    0.7687    0.4371    0.4471    0.2307    0.3842

i =

     7

b =

    0.0700
    0.3889
    0.0795
    0.2239
    0.7407
    0.6784
    0.1971
    0.7385
    0.8155
    0.6832
    0.3044
    0.8339
    0.5149
    0.5258
    0.3336
    0.0432
    0.3672
    0.1656
    0.2625
    0.7029

L =

  Columns 1 through 7

    1.0000         0         0         0         0         0         0
    0.1942    1.0000         0         0         0         0         0
    0.0282    0.7787    1.0000         0         0         0         0
    0.9112   -0.0107   -0.6804    1.0000         0         0         0
    0.7413    0.9360    0.0086   -0.2562    1.0000         0         0
    0.5045    0.4098    0.6807   -0.3785    0.3741    1.0000         0
    0.0424    0.4429   -0.1116    0.1427   -0.5526    0.5420    1.0000
    0.9872    0.6269   -0.1766    0.1133    0.9779   -0.6620   -0.9383
    0.5156    0.7350    0.3125    0.3010    0.2582   -0.9016   -0.7776
    0.7590    0.7831    0.3292   -0.5933    0.7053    0.9583    0.2425
    0.0316    0.7755    0.1322    0.7341    0.1788   -0.0813    0.3348
    0.7085    0.9833   -0.5511    0.1132    0.2500   -0.4565    0.0982
    0.9123    0.4871   -0.8653    0.9102    0.6598    0.2762    0.7854
    0.8062    0.5783   -0.0858   -0.0097    0.1317    0.7112    0.5036
    0.9494    0.7123   -0.1481   -0.3308    0.3331    0.2525    0.1336
    0.8496    0.0904   -0.3827    0.8027    0.5562   -0.0490   -0.2299
```

```
    0.3395    0.0997    0.7671    0.3000    0.4587   -0.2785   -0.4916
    0.2445    0.3848    0.2639    0.3971    0.4211   -0.2432   -0.2986
    0.7913    0.1790    0.0507    0.1240    0.0847    0.0455   -0.2855
    0.4043    0.3225    0.6919   -0.4738    0.0311    0.0957   -0.6853

  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
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
    1.0000         0         0         0         0         0         0
    0.2320    1.0000         0         0         0         0         0
    0.2781    0.2574    1.0000         0         0         0         0
    0.1366   -0.2458   -0.3807    1.0000         0         0         0
    0.3584    0.1577    0.5545   -0.4547    1.0000         0         0
    0.0207    0.1588   -0.6731    0.3855   -0.1959    1.0000         0
   -0.6990    0.3471   -0.4550    0.5495   -0.1843    0.7226    1.0000
   -0.5247    0.2471    0.3032   -0.6467    0.8605   -0.0684   -0.1553
    0.4262    0.4293   -0.7816    0.0959   -0.9570    0.5435   -0.8633
    0.5225   -0.5924   -0.3338    0.5576   -0.1721   -0.3167   -0.7126
    0.5531   -0.2624   -0.1746    0.4915   -0.2865   -0.1537   -0.2648
    0.0202    0.6822   -0.1608   -0.7286    0.4413    0.2975   -0.1442
    0.1561   -0.1906    0.5896   -0.8277    0.2942   -0.7294   -0.5417

  Columns 15 through 20

         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
         0         0         0         0         0         0
    1.0000         0         0         0         0         0
    0.6669    1.0000         0         0         0         0
    0.3378   -0.3291    1.0000         0         0         0
    0.4518   -0.5023   -0.6229    1.0000         0         0
    0.4237    0.5935   -0.4536    0.2425    1.0000         0
    0.9348   -0.3715    0.1868   -0.3423   -0.3393    1.0000


U =
```

```
  Columns 1 through 7

    0.9787    0.1013    0.7459    0.3518    0.8869    0.0632    0.0447
         0    0.8901    0.1406    0.0776    0.5979    0.4406    0.9647
         0         0    0.8104    0.6752    0.3112    0.3152   -0.3767
         0         0         0    0.7866    0.0500    0.5612    0.5130
         0         0         0         0   -1.1361    0.2686   -0.6290
         0         0         0         0         0    0.6046    1.1903
         0         0         0         0         0         0   -1.4863
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 8 through 14

    0.7030    0.9345    0.6755    0.6615    0.7345    0.8642    0.2094
    0.1913    0.7170    0.4436    0.0584    0.0089   -0.1539    0.1191
    0.5033    0.2665    0.2360    0.8557    0.0205    0.3335    0.8536
   -0.0331    0.2915   -0.1443    0.9402   -0.5057    0.3981    1.3024
   -0.3225   -0.8756   -0.5261    0.3257   -0.2592    0.1113    0.8258
   -0.2115   -0.0240    0.2693   -0.1686    0.3685    0.0436    0.0140
    0.7334    0.0010    0.1298    0.2477   -0.1527    1.0077    0.8394
    1.1047   -0.0910    0.6991   -0.3016    0.6230    0.2426    0.5640
         0   -0.8289    0.0543   -0.4079    0.3673    0.6501    0.1609
         0         0   -0.7443    0.0424   -0.6432   -0.6264   -0.5120
         0         0         0   -0.7671    0.6269    0.2174   -1.7220
         0         0         0         0    0.8803    0.2904   -0.5673
         0         0         0         0         0   -2.0965   -1.6427
         0         0         0         0         0         0    1.4608
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0
         0         0         0         0         0         0         0

  Columns 15 through 20

    0.5807    0.7792    0.8646    0.9663    0.9775    0.2637
   -0.0386    0.6668    0.4269    0.2025    0.1452    0.0682
    0.1655    0.0705    0.6363    0.2536    0.3182    0.1658
   -0.3199   -0.3506    0.4574   -0.6745   -0.4342   -0.0907
   -0.3672   -1.0762   -0.0594   -0.9850   -0.0816    0.0682
   -0.3268    0.0173   -0.0290   -0.3332   -0.5709    0.3504
```

```
    1.0105   -0.2847    0.1317    0.4730    0.7626   -0.0195
    1.3815    0.4303   -0.4611    0.6739   -0.3024    0.2677
    0.5176   -0.6009   -0.0934   -0.3363   -0.0116    0.2632
   -0.7117   -0.2644   -0.1689    0.4068   -0.4240   -0.1014
   -0.0704    0.0086   -0.3055    1.2166   -0.1701    0.9068
    0.0414   -0.4656    0.0556    0.5085   -0.4440    0.8531
   -0.6866    1.0072   -0.6885    1.1112   -0.3720    0.1829
    0.6541   -0.2668   -0.2542   -1.2781   -0.6138   -0.5075
    1.0635    0.1751   -0.3888    0.2800   -0.0447   -0.2328
         0   -0.7256   -0.0663   -0.6003   -0.7623    0.7567
         0         0   -0.4523   -1.5497   -0.6799   -0.1694
         0         0         0   -1.4840   -0.8337    0.0228
         0         0         0         0    0.7961    0.1333
         0         0         0         0         0    1.1923

piv =

    14
     3
     5
    13
     8
    10
    19
    20
    12
     4
    11
     9
    16
     1
     6
    17
    18
     7
     2
    15


ans =

  Columns 1 through 7

    0.9787    0.1013    0.7459    0.3518    0.8869    0.0632    0.0447
    0.1901    0.9098    0.2855    0.1459    0.7702    0.4528    0.9734
    0.0276    0.6960    0.9409    0.7455    0.8018    0.6600    0.3758
    0.8918    0.0828    0.1268    0.6470    0.6401    0.3996    0.7997
    0.7255    0.9082    0.6915    0.1377    0.0709    0.5867    0.1724
    0.4937    0.4158    0.9855    0.3711    0.4603    0.9196    0.9223
    0.0415    0.3986    0.0034    0.0861    0.9026    0.4219    0.0508
    0.9661    0.6580    0.6814    0.3658    0.0902    0.2089    0.7651
    0.5046    0.7065    0.7412    0.6862    0.7158    0.1481    0.6890
    0.7428    0.7740    0.9430    0.0834    0.4128    0.9326    0.6976
```

```
    0.0309    0.6935    0.2397    0.7380    0.3664    0.7962    0.3695
    0.6934    0.9470    0.2201    0.0425    0.7664    0.1590    0.3993
    0.8929    0.5261    0.0477    0.4905    0.1270    0.8545    0.0499
    0.7890    0.5965    0.6131    0.2629    0.8841    0.7386    0.6366
    0.9291    0.7302    0.6883    0.0291    0.8269    0.3836    0.5081
    0.8315    0.1665    0.3363    0.6790    0.0967    0.5432    0.6146
    0.3322    0.1231    0.8889    0.8811    0.0932    0.4304    0.0869
    0.2393    0.3673    0.4503    0.6064    0.0705    0.4570    0.3758
    0.7744    0.2395    0.6565    0.4241    0.7346    0.2647    0.6778
    0.3957    0.3280    0.9077    0.2617    0.7077    0.1860    0.9383

Columns 8 through 14

    0.7030    0.9345    0.6755    0.6615    0.7345    0.8642    0.2094
    0.3278    0.8985    0.5748    0.1869    0.1515    0.0140    0.1597
    0.6720    0.8511    0.6005    0.9198    0.0481    0.2381    0.9522
    0.2630    0.9540    0.3059    0.9602    0.1496    0.9604    0.9112
    0.3904    0.4158    0.4289    0.6372    0.4232    0.5088    0.7661
    0.4560    0.4848    0.8103    0.5374    0.8510    0.5345    0.5654
    0.8506    0.8409    0.7446    0.0688    0.1508    0.9579    0.5428
    0.9624    0.4256    0.7716    0.5412    0.9387    0.1198    0.8527
    0.4438    0.1246    0.4417    0.5000    0.4710    0.4688    0.6939
    0.9236    0.3065    0.4061    0.2534    0.6289    0.3821    0.2462
    0.5687    0.8717    0.5836    0.3001    0.4008    0.9273    0.1058
    0.8889    0.8819    0.3731    0.5436    0.7323    0.4627    0.3842
    0.5966    0.5195    0.8501    0.7148    0.5806    0.1245    0.0903
    0.0388    0.7864    0.8387    0.1606    0.9184    0.0206    0.0199
    0.0976    0.8074    0.3011    0.8973    0.7750    0.8085    0.2164
    0.5286    0.1100    0.9752    0.7167    0.2275    0.2161    0.1068
    0.7615    0.7285    0.6128    0.8856    0.4885    0.8829    0.0778
    0.6728    0.4944    0.5174    0.4433    0.2508    0.5523    0.4740
    0.3879    0.2746    0.7095    0.9109    0.8577    0.3415    0.7313
    0.3494    0.7688    0.2283    0.9478    0.0735    0.6384    0.9691

Columns 15 through 20

    0.5807    0.7792    0.8646    0.9663    0.9775    0.2637
    0.0741    0.8181    0.5949    0.3901    0.3350    0.1194
    0.1517    0.6117    0.9931    0.4385    0.4587    0.2263
    0.0970    0.3042    0.8078    0.0313    0.2384    0.0360
    0.1104    0.2159    0.8694    0.0957    0.8928    0.3521
    0.0467    0.4617    0.8198    0.2967    0.3321    0.6841
    0.9796    0.5898    0.3688    0.8428    0.5066    0.1427
    0.7742    0.7687    0.4371    0.4471    0.2307    0.3842
    0.4787    0.2353    0.8042    0.0216    0.3982    0.2528
    0.1334    0.2337    0.5697    0.9838    0.2871    0.7819
    0.3366    0.3201    0.5328    0.9716    0.1067    0.9110
    0.6581    0.2675    0.6658    0.9891    0.2139    0.5294
    0.4056    0.9197    0.1909    0.9438    0.6061    0.6551
    0.3123    0.9008    0.3597    0.0793    0.3221    0.4032
    0.8125    0.2151    0.9808    0.6382    0.8898    0.2880
    0.8415    0.6272    0.1674    0.3092    0.3222    0.8350
    0.3671    0.8444    0.4057    0.0566    0.2898    0.3228
    0.7856    0.8930    0.6132    0.5575    0.2089    0.0950
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```
    0.8039    0.0981    0.8399    0.1733    0.9021    0.8560
    0.6617    0.6330    0.9480    0.7011    0.7369    0.5181


ans =

  Columns 1 through 7

    0.9787    0.1013    0.7459    0.3518    0.8869    0.0632    0.0447
    0.1901    0.9098    0.2855    0.1459    0.7702    0.4528    0.9734
    0.0276    0.6960    0.9409    0.7455    0.8018    0.6600    0.3758
    0.8918    0.0828    0.1268    0.6470    0.6401    0.3996    0.7997
    0.7255    0.9082    0.6915    0.1377    0.0709    0.5867    0.1724
    0.4937    0.4158    0.9855    0.3711    0.4603    0.9196    0.9223
    0.0415    0.3986    0.0034    0.0861    0.9026    0.4219    0.0508
    0.9661    0.6580    0.6814    0.3658    0.0902    0.2089    0.7651
    0.5046    0.7065    0.7412    0.6862    0.7158    0.1481    0.6890
    0.7428    0.7740    0.9430    0.0834    0.4128    0.9326    0.6976
    0.0309    0.6935    0.2397    0.7380    0.3664    0.7962    0.3695
    0.6934    0.9470    0.2201    0.0425    0.7664    0.1590    0.3993
    0.8929    0.5261    0.0477    0.4905    0.1270    0.8545    0.0499
    0.7890    0.5965    0.6131    0.2629    0.8841    0.7386    0.6366
    0.9291    0.7302    0.6883    0.0291    0.8269    0.3836    0.5081
    0.8315    0.1665    0.3363    0.6790    0.0967    0.5432    0.6146
    0.3322    0.1231    0.8889    0.8811    0.0932    0.4304    0.0869
    0.2393    0.3673    0.4503    0.6064    0.0705    0.4570    0.3758
    0.7744    0.2395    0.6565    0.4241    0.7346    0.2647    0.6778
    0.3957    0.3280    0.9077    0.2617    0.7077    0.1860    0.9383

  Columns 8 through 14

    0.7030    0.9345    0.6755    0.6615    0.7345    0.8642    0.2094
    0.3278    0.8985    0.5748    0.1869    0.1515    0.0140    0.1597
    0.6720    0.8511    0.6005    0.9198    0.0481    0.2381    0.9522
    0.2630    0.9540    0.3059    0.9602    0.1496    0.9604    0.9112
    0.3904    0.4158    0.4289    0.6372    0.4232    0.5088    0.7661
    0.4560    0.4848    0.8103    0.5374    0.8510    0.5345    0.5654
    0.8506    0.8409    0.7446    0.0688    0.1508    0.9579    0.5428
    0.9624    0.4256    0.7716    0.5412    0.9387    0.1198    0.8527
    0.4438    0.1246    0.4417    0.5000    0.4710    0.4688    0.6939
    0.9236    0.3065    0.4061    0.2534    0.6289    0.3821    0.2462
    0.5687    0.8717    0.5836    0.3001    0.4008    0.9273    0.1058
    0.8889    0.8819    0.3731    0.5436    0.7323    0.4627    0.3842
    0.5966    0.5195    0.8501    0.7148    0.5806    0.1245    0.0903
    0.0388    0.7864    0.8387    0.1606    0.9184    0.0206    0.0199
    0.0976    0.8074    0.3011    0.8973    0.7750    0.8085    0.2164
    0.5286    0.1100    0.9752    0.7167    0.2275    0.2161    0.1068
    0.7615    0.7285    0.6128    0.8856    0.4885    0.8829    0.0778
    0.6728    0.4944    0.5174    0.4433    0.2508    0.5523    0.4740
    0.3879    0.2746    0.7095    0.9109    0.8577    0.3415    0.7313
    0.3494    0.7688    0.2283    0.9478    0.0735    0.6384    0.9691

  Columns 15 through 20
```

```
    0.5807    0.7792    0.8646    0.9663    0.9775    0.2637
    0.0741    0.8181    0.5949    0.3901    0.3350    0.1194
    0.1517    0.6117    0.9931    0.4385    0.4587    0.2263
    0.0970    0.3042    0.8078    0.0313    0.2384    0.0360
    0.1104    0.2159    0.8694    0.0957    0.8928    0.3521
    0.0467    0.4617    0.8198    0.2967    0.3321    0.6841
    0.9796    0.5898    0.3688    0.8428    0.5066    0.1427
    0.7742    0.7687    0.4371    0.4471    0.2307    0.3842
    0.4787    0.2353    0.8042    0.0216    0.3982    0.2528
    0.1334    0.2337    0.5697    0.9838    0.2871    0.7819
    0.3366    0.3201    0.5328    0.9716    0.1067    0.9110
    0.6581    0.2675    0.6658    0.9891    0.2139    0.5294
    0.4056    0.9197    0.1909    0.9438    0.6061    0.6551
    0.3123    0.9008    0.3597    0.0793    0.3221    0.4032
    0.8125    0.2151    0.9808    0.6382    0.8898    0.2880
    0.8415    0.6272    0.1674    0.3092    0.3222    0.8350
    0.3671    0.8444    0.4057    0.0566    0.2898    0.3228
    0.7856    0.8930    0.6132    0.5575    0.2089    0.0950
    0.8039    0.0981    0.8399    0.1733    0.9021    0.8560
    0.6617    0.6330    0.9480    0.7011    0.7369    0.5181
```

```
z =

    0.5258
   -0.0226
    0.7435
    0.5415
    0.5022
   -0.0618
    0.5670
    0.2681
    0.3774
   -0.6852
   -0.6798
    0.5194
   -1.1974
    0.4998
   -0.3785
    0.7055
   -0.0521
    0.3642
   -1.0454
   -0.2393
```

```
x =

    0.2553
    0.7290
    0.3956
   -0.5838
    0.0438
   -0.8720
```

```
   -0.5064
   -0.7411
   -0.5871
    1.7947
    0.6928
   -0.2646
    0.5820
    0.3402
   -0.3490
   -0.2723
    0.5023
    0.4704
   -1.2796
   -0.2007


r =

   1.0e-15 *

   -0.1110
   -0.1249
   -0.1110
         0
    0.3331
    0.5551
   -0.2776
         0
         0
         0
   -0.4441
   -0.1110
    0.4441
   -0.1665
         0
         0
   -0.3331
   -0.3053
         0
    0.5551


N1 =

   3.8719e-15


N2 =

   1.2179e-15
```

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