```
   demo_Polynomial_Dictionary_Learning
Starting to train the dictionary
solving the quadratic problem with YALMIP...

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.2e+00|1.7e+01|2.1e+06| 2.226984e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.922|1.8e-05|1.4e+00|1.9e+05| 2.175722e+04 -7.655237e+01| 0:0:00| chol  1↙
1
 2|0.425|0.978|9.4e-06|6.4e-02|3.4e+04| 2.529564e+04 -2.016661e+02| 0:0:00| chol  1↙
1
 3|1.000|1.000|3.0e-06|1.0e-02|1.7e+04| 1.591891e+04 -1.995882e+02| 0:0:00| chol  1↙
1
 4|0.971|1.000|2.0e-06|3.0e-03|4.9e+02| 3.028975e+02 -1.834011e+02| 0:0:00| chol  1↙
1
 5|0.617|0.130|5.7e-06|2.6e-03|5.8e+02| 4.215904e+02 -1.501289e+02| 0:0:00| chol  1↙
1
 6|0.092|0.117|4.6e-06|2.3e-03|5.8e+02| 2.980825e+02 -2.739523e+02| 0:0:00| chol  1↙
1
 7|1.000|0.597|1.4e-07|9.5e-04|5.7e+02| 4.823424e+02 -8.681420e+01| 0:0:00| chol  1↙
1
 8|0.924|1.000|1.2e-08|3.3e-07|9.5e+01| 1.719938e+01 -7.782978e+01| 0:0:00| chol  1↙
1
 9|0.826|1.000|2.2e-09|3.2e-08|3.3e+01|-2.899109e+01 -6.226830e+01| 0:0:00| chol  1↙
1
10|1.000|0.998|6.6e-14|3.5e-09|1.2e+01|-4.161726e+01 -5.366661e+01| 0:0:00| chol  1↙
1
11|1.000|1.000|5.5e-14|3.0e-10|4.3e+00|-4.854247e+01 -5.282380e+01| 0:0:00| chol  1↙
1
12|1.000|1.000|2.7e-14|3.1e-11|1.8e+00|-5.011225e+01 -5.194763e+01| 0:0:00| chol  1↙
1
13|1.000|1.000|2.2e-14|4.0e-12|5.8e-01|-5.113471e+01 -5.171349e+01| 0:0:00| chol  1↙
1
14|1.000|1.000|4.1e-14|1.3e-12|2.4e-01|-5.137494e+01 -5.161119e+01| 0:0:00| chol  1↙
1
15|1.000|1.000|1.9e-14|1.0e-12|7.0e-02|-5.150857e+01 -5.157882e+01| 0:0:00| chol  1↙
1
16|1.000|1.000|3.5e-13|1.0e-12|2.9e-02|-5.153777e+01 -5.156651e+01| 0:0:00| chol  1↙
1
17|1.000|1.000|5.7e-14|1.0e-12|7.1e-03|-5.155513e+01 -5.156223e+01| 0:0:00| chol  1↙
1
18|1.000|1.000|6.9e-12|1.0e-12|3.0e-03|-5.155821e+01 -5.156121e+01| 0:0:00| chol  1↙
1
19|1.000|0.913|1.0e-11|1.5e-12|6.2e-04|-5.156020e+01 -5.156081e+01| 0:0:00| chol  2↙
1
```

```
20|0.684|1.000|2.3e-11|2.1e-12|3.4e-04|-5.156040e+01 -5.156075e+01| 0:0:00| chol  1↙
1
21|1.000|0.945|1.9e-12|3.2e-12|8.4e-05|-5.156064e+01 -5.156072e+01| 0:0:00| chol  2↙
2
22|0.766|0.962|5.8e-13|1.1e-12|3.4e-05|-5.156068e+01 -5.156072e+01| 0:0:00| chol  2↙
1
23|0.401|1.000|9.5e-12|1.0e-12|2.4e-05|-5.156069e+01 -5.156072e+01| 0:0:00| chol  1↙
1
24|0.953|0.827|2.8e-11|1.7e-12|6.9e-06|-5.156071e+01 -5.156072e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -5.15607103e+01
 dual   objective value = -5.15607172e+01
 gap := trace(XZ)       = 6.89e-06
 relative gap           = 6.61e-08
 actual relative gap    = 6.61e-08
 rel. primal infeas     = 2.76e-11
 rel. dual   infeas     = 1.67e-12
 norm(X), norm(y), norm(Z) = 9.5e-01, 5.2e+01, 2.0e+01
 norm(A), norm(b), norm(C) = 3.5e+02, 6.7e+00, 7.7e+01
 Total CPU time (secs)  = 0.49
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 5.4e-11  0.0e+00  2.4e-12  0.0e+00  6.6e-08  6.6e-08
-------------------------------------------------------------------

ans =

   51.5607


 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.7e+04|5.1e+10| 5.587496e+08  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.962|2.6e-07|1.4e+03|2.9e+09| 5.341689e+08 -6.638038e+05| 0:0:00| chol  4↙
3
 2|0.486|0.640|1.4e-07|5.1e+02|1.6e+09| 5.471014e+08 -1.979998e+06| 0:0:00| chol  5↙
5
 3|0.374|0.428|8.5e-08|2.9e+02|1.2e+09| 5.533391e+08 -3.545825e+06| 0:0:00| chol  6↙
6
 4|0.217|0.477|7.3e-08|1.5e+02|9.5e+08| 5.506855e+08 -5.751649e+06| 0:0:00| chol  6↙
5
 5|0.281|0.371|5.0e-08|9.7e+01|8.0e+08| 5.298365e+08 -7.942732e+06| 0:0:00| chol  6↙
7
```

```
 6|0.163|0.547|3.9e-08|4.4e+01|6.5e+08| 5.102229e+08 -1.047860e+07| 0:0:00| chol  6↙
6
 7|0.340|0.265|3.0e-08|3.2e+01|5.7e+08| 4.623673e+08 -1.262066e+07| 0:0:00| chol  8↙
10
 8|0.090|0.699|5.5e-08|9.7e+00|4.9e+08| 4.473024e+08 -1.223740e+07| 0:0:00| chol  5↙
5
 9|0.180|0.191|4.7e-08|7.9e+00|4.7e+08| 4.244658e+08 -1.482796e+07| 0:0:00| chol  6↙
6
10|0.096|0.448|2.1e-07|4.3e+00|4.4e+08| 4.059382e+08 -1.177708e+07| 0:0:00| chol  5↙
6
11|0.187|0.353|1.3e-07|2.8e+00|4.2e+08| 3.806350e+08 -1.668559e+07| 0:0:00| chol  7↙
6
12|0.226|0.286|1.7e-07|2.0e+00|4.0e+08| 3.484406e+08 -2.072776e+07| 0:0:00| chol  9↙
9
13|0.179|0.287|2.5e-07|1.4e+00|3.8e+08| 3.281391e+08 -2.344087e+07| 0:0:00| chol 18↙
30
14|0.148|0.252|3.5e-06|1.1e+00|3.6e+08| 3.103274e+08 -2.537661e+07| 0:0:00| chol 10↙
19
15|0.109|0.496|1.8e-05|5.4e-01|3.4e+08| 2.986395e+08 -2.093373e+07| 0:0:00| chol  6↙
8
16|0.112|0.240|1.7e-05|4.1e-01|3.3e+08| 2.851275e+08 -2.328771e+07| 0:0:00| chol 13↙
30
17|0.040|0.119|6.1e-05|3.6e-01|3.2e+08| 2.786045e+08 -1.985032e+07| 0:0:00| chol 11↙
11
18|0.165|0.217|6.4e-05|2.8e-01|3.1e+08| 2.646176e+08 -2.353248e+07| 0:0:00| chol
  warning: symqmr failed: 0.3
  switch to LU factor. lu 30  10
19|0.139|0.143|7.8e-05|2.4e-01|3.0e+08| 2.501111e+08 -2.712418e+07| 0:0:00| lu 30↙
11
20|0.151|0.209|3.2e-05|1.9e-01|2.9e+08| 2.398972e+08 -2.814748e+07| 0:0:00| lu 30↙
7
21|0.083|0.245|4.7e-05|1.4e-01|2.8e+08| 2.310270e+08 -2.896450e+07| 0:0:00| lu 30↙
11
22|0.111|0.173|5.5e-05|1.2e-01|2.8e+08| 2.237464e+08 -2.758775e+07| 0:0:00| lu 30↙
8
23|0.131|0.132|6.7e-05|1.0e-01|2.7e+08| 2.126546e+08 -2.961626e+07| 0:0:00| lu 30↙
^25
24|0.108|0.137|1.2e-04|8.9e-02|2.6e+08| 2.068986e+08 -3.000859e+07| 0:0:00| lu 12↙
30
25|0.081|0.123|4.9e-04|7.8e-02|2.6e+08| 2.011410e+08 -3.123377e+07| 0:0:00| lu 30 ^↙
7
26|0.000|0.000|1.8e-04|7.8e-02|2.6e+08| 2.014917e+08 -3.006349e+07| 0:0:00| lu 29↙
11
27|0.096|0.105|1.5e-04|7.0e-02|2.5e+08| 1.952869e+08 -3.133758e+07| 0:0:00| lu 13↙
9
28|0.101|0.186|2.3e-04|5.7e-02|2.4e+08| 1.916764e+08 -2.939615e+07| 0:0:00| lu 22↙
8
29|0.121|0.220|4.4e-04|4.5e-02|2.3e+08| 1.798987e+08 -2.846165e+07| 0:0:00| lu *14↙
3
30|0.351|0.488|2.5e-04|2.3e-02|2.0e+08| 1.594649e+08 -2.231175e+07| 0:0:00| lu 12↙
5
31|0.958|0.469|2.1e-04|1.2e-02|1.1e+08| 7.716424e+07 -2.671886e+07| 0:0:00| lu  6↙
2
32|0.685|0.617|6.3e-04|4.6e-03|8.3e+07| 6.592526e+07 -1.372027e+07| 0:0:00| lu  5↙
```

```
2
33|0.848|1.000|1.0e-04|6.4e-05|3.6e+07| 2.515293e+07 -1.009134e+07| 0:0:00| lu  5↙
2
34|1.000|1.000|2.1e-06|2.0e-05|1.8e+07| 1.445961e+07 -3.851249e+06| 0:0:00| lu  5↙
2
35|0.977|1.000|5.0e-06|4.1e-07|4.8e+06| 3.525749e+06 -1.302512e+06| 0:0:00| lu  4↙
2
36|1.000|1.000|7.0e-08|6.2e-07|2.3e+06| 1.756849e+06 -5.119268e+05| 0:0:00| lu  4↙
2
37|1.000|1.000|2.5e-07|1.4e-08|6.6e+05| 4.755152e+05 -1.796786e+05| 0:0:01| lu  3↙
2
38|1.000|1.000|3.3e-08|2.1e-08|2.8e+05| 2.184485e+05 -6.411727e+04| 0:0:01| lu  3↙
2
39|1.000|1.000|2.5e-08|6.7e-09|8.5e+04| 6.128908e+04 -2.355983e+04| 0:0:01| lu  4↙
2
40|1.000|1.000|6.8e-09|5.1e-09|3.6e+04| 2.762665e+04 -8.076618e+03| 0:0:01| lu  4↙
1
41|1.000|1.000|4.9e-09|1.4e-09|1.1e+04| 7.772692e+03 -3.024807e+03| 0:0:01| lu  4↙
1
42|1.000|1.000|4.0e-09|9.9e-10|4.5e+03| 3.492369e+03 -1.040975e+03| 0:0:01| lu  3↙
1
43|1.000|1.000|3.3e-09|8.1e-10|1.4e+03| 9.526008e+02 -4.096125e+02| 0:0:01| lu  3↙
1
44|1.000|1.000|1.0e-09|6.5e-10|5.7e+02| 4.113418e+02 -1.633082e+02| 0:0:01| lu  3↙
1
45|1.000|1.000|6.7e-10|2.1e-10|1.7e+02| 8.269144e+01 -8.516826e+01| 0:0:01| lu  4↙
1
46|1.000|1.000|5.1e-10|1.3e-10|7.2e+01| 1.546309e+01 -5.626322e+01| 0:0:01| lu  3↙
1
47|1.000|1.000|2.4e-10|1.0e-10|2.0e+01|-2.715009e+01 -4.683672e+01| 0:0:01| lu  3↙
1
48|1.000|1.000|2.3e-10|4.8e-11|8.7e+00|-3.504897e+01 -4.378614e+01| 0:0:01| lu  3↙
1
49|0.995|1.000|1.5e-10|4.7e-11|2.2e+00|-4.050301e+01 -4.269876e+01| 0:0:01| lu  3↙
1
50|1.000|1.000|5.3e-11|3.0e-11|1.0e+00|-4.141636e+01 -4.242230e+01| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -4.14163576e+01
 dual   objective value = -4.24223049e+01
 gap := trace(XZ)       = 1.01e+00
 relative gap           = 1.19e-02
 actual relative gap    = 1.19e-02
 rel. primal infeas     = 5.31e-11
 rel. dual   infeas     = 2.98e-11
 norm(X), norm(y), norm(Z) = 1.3e+04, 6.1e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 5.9e+06, 1.5e+06, 7.7e+01
 Total CPU time (secs)  = 0.59
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 1.0e-10  0.0e+00  4.3e-11  0.0e+00  1.2e-02  1.2e-02
-----------------------------------------------------------------
```

```
ans =

   42.3803

Iteration   2   Total error is: 0.029265

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
 number of nearly dependent constraints = 1
 To remove these constraints, re-run sqlp.m with OPTIONS.rmdepconstr = 1.
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|1.1e+06|2.8e+12| 3.076502e+10  0.000000e+00| 0:0:00| chol  3↙
3
 1|1.000|0.932|4.7e-07|7.6e+04|2.4e+11| 2.945005e+10 -1.241590e+07| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 19   3
 2|0.321|0.824|3.5e-07|1.3e+04|8.5e+10| 3.204496e+10 -1.199152e+08| 0:0:00| lu 12↙
6
 3|0.496|0.396|1.8e-07|8.0e+03|6.8e+10| 3.198380e+10 -1.710249e+08| 0:0:00| lu  8↙
5
 4|0.213|0.486|1.3e-07|4.1e+03|5.2e+10| 3.157726e+10 -2.700811e+08| 0:0:00| lu 11↙
3
 5|0.246|0.403|9.0e-08|2.5e+03|4.3e+10| 3.027159e+10 -3.799394e+08| 0:0:00| lu 22↙
^12
 6|0.182|0.480|5.0e-07|1.3e+03|3.7e+10| 2.893788e+10 -5.062873e+08| 0:0:00| lu 30↙
17
 7|0.281|0.327|6.7e-07|8.6e+02|3.2e+10| 2.655659e+10 -6.221306e+08| 0:0:00| lu 30↙
^18
 8|0.123|0.561|4.6e-07|3.8e+02|2.9e+10| 2.547035e+10 -7.028996e+08| 0:0:00| lu 19↙
5
 9|0.252|0.225|3.2e-07|2.9e+02|2.7e+10| 2.353013e+10 -8.279716e+08| 0:0:00| lu 12↙
^12
10|0.044|0.433|7.3e-07|1.7e+02|2.5e+10| 2.295070e+10 -5.586210e+08| 0:0:00| lu 18↙
4
11|0.268|0.324|7.2e-07|1.1e+02|2.3e+10| 2.098209e+10 -8.519945e+08| 0:0:00| lu 12↙
^10
12|0.236|0.226|1.0e-06|8.7e+01|2.2e+10| 1.937267e+10 -1.048009e+09| 0:0:00| lu 13↙
^26
13|0.147|0.425|2.9e-06|5.0e+01|2.1e+10| 1.851908e+10 -1.046328e+09| 0:0:00| lu 30↙
^29
14|0.107|0.251|9.4e-06|3.7e+01|2.0e+10| 1.774962e+10 -1.168864e+09| 0:0:00| lu 30↙
^19
15|0.082|0.375|1.7e-05|2.3e+01|1.9e+10| 1.715664e+10 -1.277251e+09| 0:0:00| lu 30↙
21
16|0.074|0.164|9.5e-05|2.0e+01|1.9e+10| 1.673309e+10 -1.345539e+09| 0:0:00| lu 18↙
^21
17|0.012|0.022|9.6e-05|1.9e+01|1.9e+10| 1.679620e+10 -1.846592e+09| 0:0:00| lu 30↙
```

```
^21
18|0.037|0.078|5.1e-05|1.8e+01|2.0e+10| 1.651227e+10 -1.631778e+09| 0:0:00| lu 15↙
4
19|0.507|0.650|2.6e-05|6.2e+00|1.3e+10| 1.059876e+10 -1.487777e+09| 0:0:00| lu 19↙
20
20|0.444|0.501|2.0e-04|3.1e+00|9.4e+09| 7.287145e+09 -1.218790e+09| 0:0:00| lu 19↙
30
21|0.117|0.135|1.8e-04|2.7e+00|9.1e+09| 6.965840e+09 -1.265408e+09| 0:0:00| lu 18↙
30
22|0.006|0.010|1.7e-04|2.6e+00|9.1e+09| 6.951313e+09 -1.220966e+09| 0:0:00| lu 11↙
^17
23|0.000|0.000|1.8e-04|2.6e+00|9.1e+09| 6.953444e+09 -1.236671e+09| 0:0:00| lu 30↙
30
24|0.004|0.011|4.7e-04|2.6e+00|9.1e+09| 6.977090e+09 -1.287225e+09| 0:0:01| lu 13↙
^19
25|0.004|0.033|6.5e-04|2.5e+00|9.0e+09| 6.947284e+09 -1.126561e+09| 0:0:01| lu 14↙
30
26|0.024|0.097|4.9e-04|2.3e+00|9.1e+09| 6.923366e+09 -1.417638e+09| 0:0:01| lu 15↙
^13
27|0.045|0.063|5.6e-04|2.1e+00|9.0e+09| 6.757069e+09 -1.208089e+09| 0:0:01| lu 20↙
^13
28|0.292|0.381|2.8e-04|1.3e+00|8.8e+09| 6.067581e+09 -1.705378e+09| 0:0:01| lu 28 ^↙
2
29|0.693|0.779|2.1e-04|2.9e-01|4.1e+09| 3.017215e+09 -6.697949e+08| 0:0:01| lu 30↙
^11
30|0.000|0.000|1.7e-04|2.9e-01|4.0e+09| 3.021961e+09 -6.873234e+08| 0:0:01| lu 14↙
^23
31|0.002|0.002|1.0e-03|2.9e-01|3.9e+09| 3.014745e+09 -5.867428e+08| 0:0:01| lu 16 ^↙
9
32|0.126|0.044|1.1e-03|2.8e-01|3.9e+09| 2.870918e+09 -6.461068e+08| 0:0:01| lu 13↙
30
33|0.002|0.001|5.9e-04|2.8e-01|3.9e+09| 2.908525e+09 -1.041029e+09| 0:0:01| lu 30↙
^20
34|0.005|0.010|1.0e-03|2.8e-01|3.8e+09| 2.880382e+09 -8.726772e+08| 0:0:01| lu 14 ^↙
9
35|0.310|0.183|5.4e-04|2.3e-01|3.7e+09| 2.540271e+09 -9.863529e+08| 0:0:01| lu 16 ^↙
4
36|0.480|0.310|5.8e-03|1.6e-01|3.2e+09| 2.069755e+09 -1.096284e+09| 0:0:01| lu 30 ^↙
9
37|0.032|0.091|4.7e-03|1.4e-01|3.1e+09| 2.076816e+09 -1.046588e+09| 0:0:01| lu 19↙
30
38|0.000|0.000|4.4e-03|1.4e-01|3.1e+09| 2.088412e+09 -1.187689e+09| 0:0:01| lu 30↙
30
39|0.001|0.002|3.1e-03|1.4e-01|3.0e+09| 2.104194e+09 -1.206170e+09| 0:0:01| lu 12↙
30
40|0.001|0.001|1.9e-03|1.4e-01|3.1e+09| 2.115416e+09 -1.355166e+09| 0:0:01| lu 22 ^↙
8
41|0.171|0.308|1.3e-03|9.7e-02|3.2e+09| 2.000854e+09 -1.431139e+09| 0:0:01| lu 29↙
13
42|0.422|0.625|2.9e-03|3.7e-02|2.3e+09| 1.531498e+09 -4.700784e+08| 0:0:01| lu 13↙
^10
43|1.000|0.609|5.1e-03|1.4e-02|1.6e+09| 8.844749e+08 -3.814099e+08| 0:0:01| lu 16↙
^14
44|0.012|0.012|9.1e-03|1.4e-02|1.7e+09| 9.749269e+08 -2.090430e+08| 0:0:01| lu 26↙
```

```
^29
45|0.134|0.390|6.5e-03|8.6e-03|1.7e+09| 9.702568e+08 -3.330213e+08| 0:0:01| lu 25↙
^11
46|0.811|0.301|3.2e-04|6.0e-03|1.7e+09| 8.889406e+08 -3.575221e+08| 0:0:01| lu 24↙
19
47|0.792|0.941|6.1e-04|3.7e-04|1.0e+09| 7.146381e+08 -2.447404e+08| 0:0:01| lu 30↙
7
48|0.826|0.960|5.6e-04|5.9e-05|3.2e+08| 2.329794e+08 -5.257739e+07| 0:0:01| lu 30↙
7
49|0.957|1.000|1.3e-04|3.9e-05|1.3e+08| 8.399234e+07 -3.858798e+07| 0:0:01| lu 28↙
7
50|1.000|1.000|9.7e-06|2.5e-05|6.9e+07| 4.858335e+07 -1.397651e+07| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  2.90852459e+09
 dual   objective value = -1.04102870e+09
 gap := trace(XZ)       = 3.87e+09
 relative gap           = 9.80e-01
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 5.89e-04
 rel. dual   infeas     = 2.79e-01
 norm(X), norm(y), norm(Z) = 1.7e+10, 1.0e+09, 1.5e+09
 norm(A), norm(b), norm(C) = 1.9e+08, 5.2e+07, 7.7e+01
 Total CPU time (secs)  = 1.09
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 7.4e-04  0.0e+00  4.0e-01  0.0e+00  1.0e+00  9.8e-01
-----------------------------------------------------------------

ans =

   1.2545e+10

Iteration   3   Total error is: 3.8564

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*****************************************************************
   SDPT3: Infeasible path-following algorithms
*****************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-----------------------------------------------------------------
 0|0.000|0.000|1.0e+00|2.3e+03|4.5e+09| 4.941274e+07  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.942|5.4e-07|1.4e+02|3.4e+08| 4.728435e+07 -2.664341e+04| 0:0:00| chol  3↙
3
 2|0.375|0.762|3.5e-07|3.3e+01|1.5e+08| 5.112309e+07 -1.850851e+05| 0:0:00| chol  3↙
3
 3|0.501|0.390|1.7e-07|2.0e+01|1.2e+08| 5.201124e+07 -2.876139e+05| 0:0:00| chol  3↙
3
```

```
 4|0.166|0.503|1.4e-07|9.9e+00|8.8e+07| 5.187804e+07 -4.984170e+05| 0:0:00| chol  3↙
3
 5|0.301|0.332|1.0e-07|6.6e+00|7.5e+07| 4.983303e+07 -6.897051e+05| 0:0:00| chol  3↙
3
 6|0.115|0.571|9.0e-08|2.8e+00|6.1e+07| 4.858087e+07 -9.907128e+05| 0:0:00| chol  3↙
3
 7|0.315|0.253|6.1e-08|2.1e+00|5.5e+07| 4.485022e+07 -1.216334e+06| 0:0:00| chol  3↙
4
 8|0.053|0.573|6.6e-08|9.0e-01|4.9e+07| 4.368411e+07 -1.039905e+06| 0:0:00| chol  3↙
3
 9|0.151|0.293|1.1e-07|6.4e-01|4.7e+07| 4.167708e+07 -1.400395e+06| 0:0:00| chol  3↙
4
10|0.335|0.330|2.3e-07|4.3e-01|4.3e+07| 3.726913e+07 -1.952636e+06| 0:0:00| chol  4↙
4
11|0.386|0.211|2.4e-06|3.4e-01|4.0e+07| 3.304953e+07 -2.369212e+06| 0:0:00| chol  3↙
4
12|0.287|0.287|2.9e-06|2.4e-01|3.9e+07| 3.311913e+07 -3.257242e+06| 0:0:00| chol  3↙
3
13|0.205|0.472|2.0e-06|1.3e-01|2.9e+07| 2.419430e+07 -1.160901e+06| 0:0:00| chol  3↙
3
14|0.869|1.000|2.4e-07|2.3e-05|5.2e+06| 4.781924e+06 -4.557052e+05| 0:0:00| chol  2↙
2
15|1.000|1.000|6.6e-08|1.1e-05|3.1e+06| 2.348434e+06 -7.533484e+05| 0:0:00| chol  2↙
3
16|1.000|1.000|1.4e-07|5.6e-06|1.3e+06| 1.040713e+06 -2.759181e+05| 0:0:00| chol  2↙
3
17|0.996|1.000|8.1e-09|2.8e-06|3.7e+05| 2.691849e+05 -1.048897e+05| 0:0:00| chol  2↙
3
18|1.000|1.000|2.6e-08|1.4e-06|1.7e+05| 1.320288e+05 -3.795587e+04| 0:0:00| chol  2↙
3
19|1.000|1.000|2.3e-09|7.1e-07|5.1e+04| 3.726223e+04 -1.403568e+04| 0:0:00| chol  2↙
2
20|1.000|1.000|1.3e-09|7.1e-08|2.2e+04| 1.666019e+04 -4.861260e+03| 0:0:00| chol  2↙
3
21|1.000|1.000|1.2e-09|7.3e-09|6.6e+03| 4.712955e+03 -1.837778e+03| 0:0:00| chol  2↙
2
22|1.000|1.000|1.4e-09|9.4e-10|2.7e+03| 2.093710e+03 -6.450466e+02| 0:0:00| chol  2↙
2
23|1.000|1.000|1.6e-10|3.5e-10|8.3e+02| 5.597915e+02 -2.654352e+02| 0:0:00| chol  2↙
2
24|1.000|1.000|2.9e-10|3.8e-11|3.5e+02| 2.303080e+02 -1.172465e+02| 0:0:00| chol  2↙
2
25|1.000|1.000|1.9e-10|4.7e-11|1.0e+02| 3.104189e+01 -7.039574e+01| 0:0:00| chol  2↙
2
26|1.000|1.000|7.0e-11|3.9e-11|4.3e+01|-9.760452e+00 -5.317049e+01| 0:0:00| chol  2↙
2
27|1.000|1.000|1.3e-10|1.4e-11|1.2e+01|-3.579839e+01 -4.759382e+01| 0:0:00| chol  2↙
2
28|1.000|1.000|1.6e-11|2.1e-11|5.3e+00|-4.055839e+01 -4.584261e+01| 0:0:00| chol  2↙
2
29|0.990|1.000|1.7e-11|3.3e-12|1.3e+00|-4.392680e+01 -4.522446e+01| 0:0:00| chol  2↙
2
30|1.000|1.000|4.2e-11|3.4e-12|6.0e-01|-4.448177e+01 -4.508176e+01| 0:0:00| chol  2↙
2
```

```
31|0.965|1.000|1.3e-11|5.1e-12|1.2e-01|-4.489926e+01 -4.502228e+01| 0:0:00| chol  2↙
2
32|1.000|1.000|1.2e-11|2.6e-12|5.3e-02|-4.496123e+01 -4.501464e+01| 0:0:00| chol  2↙
2
33|0.965|0.994|2.0e-11|2.3e-12|9.2e-03|-4.500172e+01 -4.501090e+01| 0:0:00| chol  4↙
4
34|1.000|1.000|3.0e-11|3.5e-12|3.4e-03|-4.500721e+01 -4.501059e+01| 0:0:00| chol  4↙
4
35|1.000|1.000|9.2e-11|5.2e-12|8.8e-04|-4.500961e+01 -4.501048e+01| 0:0:00| chol  8↙
7
36|1.000|0.964|1.9e-10|8.0e-12|1.8e-04|-4.501028e+01 -4.501047e+01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 14   2
37|0.975|0.848|1.4e-09|1.3e-11|1.6e-05|-4.501045e+01 -4.501046e+01| 0:0:00| lu 30↙
30
38|1.000|0.821|8.9e-09|2.0e-11|2.2e-06|-4.501047e+01 -4.501046e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 38
 primal objective value = -4.50104701e+01
 dual   objective value = -4.50104620e+01
 gap := trace(XZ)       = 2.21e-06
 relative gap           = 2.43e-08
 actual relative gap    = -8.91e-08
 rel. primal infeas     = 8.90e-09
 rel. dual   infeas     = 1.98e-11
 norm(X), norm(y), norm(Z) = 3.6e+02, 5.8e+01, 2.3e+01
 norm(A), norm(b), norm(C) = 3.9e+05, 9.8e+04, 7.7e+01
 Total CPU time (secs)  = 0.26
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.3e-08  0.0e+00  2.8e-11  0.0e+00  -8.9e-08  2.4e-08
-----------------------------------------------------------------

ans =

   45.0105

Iteration   4   Total error is: 0.029278

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*****************************************************************
   SDPT3: Infeasible path-following algorithms
*****************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-----------------------------------------------------------------
 0|0.000|0.000|1.0e+00|4.6e+05|7.7e+11| 8.362964e+09  0.000000e+00| 0:0:00| chol  3↙
3
 1|1.000|0.941|6.1e-07|2.7e+04|5.8e+10| 8.004222e+09 -5.006387e+06| 0:0:00| chol  9↙
8
```

```
 2|0.360|0.753|3.9e-07|6.6e+03|2.5e+10| 8.630893e+09 -3.203587e+07| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   4
 3|0.494|0.376|1.9e-07|4.1e+03|2.0e+10| 8.795155e+09 -5.066768e+07| 0:0:00| lu 30↙
7
 4|0.165|0.515|1.6e-07|2.0e+03|1.5e+10| 8.790556e+09 -8.906693e+07| 0:0:00| lu 19↙
5
 5|0.321|0.320|1.1e-07|1.4e+03|1.3e+10| 8.441828e+09 -1.219483e+08| 0:0:00| lu 29↙
15
 6|0.116|0.644|3.4e-07|4.8e+02|1.0e+10| 8.231084e+09 -1.658582e+08| 0:0:00| lu 30↙
11
 7|0.310|0.226|2.2e-07|3.7e+02|9.2e+09| 7.619044e+09 -1.999401e+08| 0:0:00| lu 30↙
^25
 8|0.085|0.650|5.1e-07|1.3e+02|8.0e+09| 7.337300e+09 -7.896446e+07| 0:0:00| lu 17↙
3
 9|0.211|0.295|4.4e-07|9.2e+01|7.5e+09| 6.863266e+09 -1.591826e+08| 0:0:00| lu 30↙
6
10|0.207|0.180|3.8e-07|7.5e+01|7.0e+09| 6.345631e+09 -2.071428e+08| 0:0:00| lu 15↙
^30
11|0.133|0.218|4.3e-07|5.9e+01|6.8e+09| 6.095360e+09 -2.375381e+08| 0:0:00| lu 12↙
30
12|0.092|0.559|1.8e-06|2.6e+01|6.4e+09| 5.925931e+09 -2.009337e+08| 0:0:00| lu 30↙
30
13|0.089|0.133|3.8e-06|2.3e+01|6.2e+09| 5.747606e+09 -2.294402e+08| 0:0:00| lu 25↙
30
14|0.009|0.039|1.1e-05|2.2e+01|6.2e+09| 5.658574e+09 -1.641005e+08| 0:0:00| lu 25↙
13
15|0.150|0.368|4.3e-05|1.4e+01|6.0e+09| 5.479364e+09 -2.367564e+08| 0:0:00| lu 30 ^↙
9
16|0.061|0.346|5.5e-05|8.9e+00|6.0e+09| 5.293192e+09 -4.209884e+08| 0:0:00| lu 30↙
6
17|0.320|0.455|5.0e-05|4.9e+00|4.8e+09| 4.215332e+09 -3.651853e+08| 0:0:00| lu 17↙
^24
18|0.184|0.518|4.2e-05|2.3e+00|4.4e+09| 3.973071e+09 -2.317346e+08| 0:0:00| lu 30↙
^17
19|0.007|0.008|3.8e-04|2.3e+00|4.4e+09| 3.961439e+09 -2.485477e+08| 0:0:00| lu 26↙
^16
20|0.000|0.000|3.5e-04|2.3e+00|4.4e+09| 3.962397e+09 -2.515633e+08| 0:0:00| lu 30↙
^14
21|0.000|0.000|2.4e-04|2.3e+00|4.4e+09| 3.962599e+09 -2.363725e+08| 0:0:00| lu 18↙
^15
22|0.119|0.083|1.4e-04|2.1e+00|4.3e+09| 3.841250e+09 -2.974876e+08| 0:0:00| lu 30↙
^23
23|0.000|0.000|2.1e-04|2.1e+00|4.3e+09| 3.839235e+09 -2.985102e+08| 0:0:00| lu 21↙
^13
24|0.540|0.153|2.1e-04|1.8e+00|4.1e+09| 3.253945e+09 -4.309446e+08| 0:0:01| lu 21↙
25
25|0.112|0.314|1.6e-04|1.2e+00|4.0e+09| 3.155586e+09 -4.460818e+08| 0:0:01| lu 14↙
17
26|0.270|0.473|1.5e-04|6.5e-01|3.8e+09| 2.931283e+09 -5.065817e+08| 0:0:01| lu 30↙
5
27|1.000|0.813|6.4e-05|1.2e-01|6.7e+08| 3.911970e+08 -1.808534e+08| 0:0:01| lu 30↙
13
28|0.852|0.911|1.7e-04|1.1e-02|2.2e+08| 1.638344e+08 -4.740083e+07| 0:0:01| lu 30↙
```

```
^14
29|0.339|0.681|1.8e-04|3.5e-03|2.3e+08| 1.743471e+08 -4.710336e+07| 0:0:01| lu 21↙
9
30|0.347|0.864|1.8e-04|4.8e-04|1.7e+08| 1.371393e+08 -3.282726e+07| 0:0:01| lu 30↙
18
31|0.982|0.793|8.5e-05|1.1e-04|1.1e+08| 8.518878e+07 -2.809963e+07| 0:0:01| lu 30↙
8
32|0.741|1.000|1.0e-04|1.7e-05|5.9e+07| 4.782492e+07 -9.787851e+06| 0:0:01| lu 15↙
4
33|0.998|1.000|7.7e-06|2.1e-05|1.8e+07| 1.221723e+07 -5.041735e+06| 0:0:01| lu 30↙
9
34|1.000|1.000|1.5e-05|1.5e-06|7.9e+06| 6.126196e+06 -1.712511e+06| 0:0:01| lu 11↙
6
35|1.000|1.000|1.7e-06|2.3e-06|2.8e+06| 2.003112e+06 -7.516734e+05| 0:0:01| lu  9↙
6
36|1.000|1.000|3.5e-07|3.3e-07|1.1e+06| 8.387937e+05 -2.440494e+05| 0:0:01| lu 30↙
6
37|1.000|1.000|1.6e-07|7.0e-08|3.6e+05| 2.625775e+05 -1.005936e+05| 0:0:01| lu 18↙
3
38|1.000|1.000|4.4e-08|3.3e-08|1.5e+05| 1.120926e+05 -3.287065e+04| 0:0:01| lu 30↙
3
39|1.000|1.000|6.6e-08|8.8e-09|4.5e+04| 3.250403e+04 -1.265061e+04| 0:0:01| lu  7↙
3
40|1.000|1.000|8.9e-09|1.3e-08|1.9e+04| 1.444569e+04 -4.243448e+03| 0:0:01| lu 30↙
2
41|1.000|1.000|7.5e-09|1.8e-09|5.7e+03| 4.067072e+03 -1.624322e+03| 0:0:01| lu 20↙
3
42|1.000|1.000|6.2e-09|1.5e-09|2.4e+03| 1.819460e+03 -5.720235e+02| 0:0:01| lu  9↙
3
43|1.000|1.000|4.0e-09|1.2e-09|7.2e+02| 4.786467e+02 -2.395473e+02| 0:0:01| lu 30↙
7
44|1.000|1.000|6.2e-09|8.0e-10|3.0e+02| 1.941111e+02 -1.093631e+02| 0:0:01| lu 12↙
3
45|1.000|1.000|2.6e-09|1.2e-09|8.9e+01| 2.067727e+01 -6.796600e+01| 0:0:01| lu 18↙
5
46|1.000|1.000|1.7e-09|5.3e-10|3.8e+01|-1.468001e+01 -5.262479e+01| 0:0:01| lu 12↙
2
47|1.000|1.000|1.1e-09|3.4e-10|1.1e+01|-3.702115e+01 -4.761566e+01| 0:0:01| lu 14↙
2
48|1.000|1.000|1.3e-09|2.1e-10|4.7e+00|-4.124786e+01 -4.594429e+01| 0:0:01| lu 23↙
2
49|1.000|1.000|4.2e-10|2.7e-10|1.2e+00|-4.414077e+01 -4.536066e+01| 0:0:01| lu 27 ^↙
3
50|1.000|1.000|7.7e-10|8.5e-11|5.6e-01|-4.463840e+01 -4.519765e+01| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -4.46383976e+01
 dual   objective value = -4.51976480e+01
 gap := trace(XZ)       = 5.60e-01
 relative gap           = 6.16e-03
 actual relative gap    = 6.16e-03
 rel. primal infeas     = 7.71e-10
 rel. dual   infeas     = 8.47e-11
```

```
 norm(X), norm(y), norm(Z) = 1.3e+05, 5.8e+01, 2.3e+01
 norm(A), norm(b), norm(C) = 7.6e+07, 1.6e+07, 7.7e+01
 Total CPU time (secs)  = 0.91
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 1.1e-09  0.0e+00  1.2e-10  0.0e+00  6.2e-03  6.2e-03
------------------------------------------------------------------

ans =

   45.1735

Iteration   5   Total error is: 0.029266

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
 number of nearly dependent constraints = 1
 To remove these constraints, re-run sqlp.m with OPTIONS.rmdepconstr = 1.
******************************************************************
   SDPT3: Infeasible path-following algorithms
******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.3e+06|8.2e+12| 8.955144e+10  0.000000e+00| 0:0:00| chol  3↙
3
 1|1.000|0.920|2.6e-06|2.6e+05|7.8e+11| 8.573387e+10 -4.466973e+07| 0:0:00| chol  8↙
10
 2|0.317|0.797|1.8e-06|5.4e+04|2.9e+11| 9.484135e+10 -4.277876e+08| 0:0:00| chol 12↙
18
 3|0.547|0.386|8.1e-07|3.3e+04|2.3e+11| 9.856046e+10 -6.052517e+08| 0:0:00| chol
  warning: symqmr failed: 0.3
  switch to LU factor. lu 17  11
 4|0.175|0.469|6.8e-07|1.8e+04|1.8e+11| 9.862243e+10 -1.011947e+09| 0:0:00| lu 30↙
4
 5|0.235|0.364|5.1e-07|1.1e+04|1.5e+11| 9.602688e+10 -1.465203e+09| 0:0:00| lu 22↙
10
 6|0.131|0.485|4.6e-07|5.8e+03|1.2e+11| 9.335333e+10 -2.199400e+09| 0:0:00| lu 30↙
6
 7|0.298|0.295|2.9e-07|4.1e+03|1.1e+11| 8.587366e+10 -2.806578e+09| 0:0:00| lu 30↙
^10
 8|0.087|0.653|2.7e-07|1.4e+03|9.5e+10| 8.285299e+10 -3.590109e+09| 0:0:00| lu 30↙
10
 9|0.233|0.215|2.2e-07|1.1e+03|9.0e+10| 7.710441e+10 -4.261450e+09| 0:0:00| lu 30↙
11
10|0.060|0.513|4.7e-07|5.4e+02|8.1e+10| 7.363726e+10 -1.406744e+09| 0:0:00| lu 12↙
5
11|0.244|0.357|4.2e-07|3.5e+02|7.4e+10| 6.579693e+10 -3.088862e+09| 0:0:00| lu 30↙
10
12|0.167|0.172|3.9e-07|2.9e+02|7.0e+10| 6.159408e+10 -4.009892e+09| 0:0:00| lu 17↙
30
13|0.118|0.204|1.0e-05|2.3e+02|6.9e+10| 5.890716e+10 -4.500472e+09| 0:0:00| lu 13↙
```

```
30
14|0.077|0.302|4.0e-05|1.6e+02|6.6e+10| 5.709223e+10 -4.072228e+09| 0:0:00| lu 30 ^↙
9
15|0.000|0.000|2.7e-05|1.6e+02|6.6e+10| 5.708477e+10 -4.093153e+09| 0:0:00| lu 30 ^↙
9
16|0.001|0.003|2.0e-05|1.6e+02|6.6e+10| 5.705954e+10 -4.094644e+09| 0:0:00| lu 15 ^↙
8
17|0.000|0.000|5.2e-05|1.6e+02|6.6e+10| 5.703923e+10 -4.241897e+09| 0:0:00| lu 20↙
^15
18|0.018|0.071|4.9e-05|1.5e+02|6.6e+10| 5.673652e+10 -4.282673e+09| 0:0:00| lu 12↙
^21
19|0.049|0.187|6.3e-05|1.2e+02|6.4e+10| 5.543641e+10 -3.936394e+09| 0:0:00| lu 13↙
^17
20|0.021|0.049|1.2e-04|1.1e+02|6.4e+10| 5.529311e+10 -4.464632e+09| 0:0:00| lu 12 ^↙
5
21|0.019|0.030|1.0e-04|1.1e+02|6.4e+10| 5.481538e+10 -4.612890e+09| 0:0:00| lu 30↙
^13
22|0.056|0.130|2.6e-04|9.6e+01|6.4e+10| 5.376187e+10 -5.498191e+09| 0:0:00| lu 20↙
^13
23|0.001|0.003|2.9e-04|9.6e+01|6.4e+10| 5.370196e+10 -4.873362e+09| 0:0:00| lu 17 ^↙
9
24|0.034|0.086|2.2e-04|8.8e+01|6.4e+10| 5.294792e+10 -5.432098e+09| 0:0:00| lu 18↙
30
25|0.132|0.115|2.8e-04|7.8e+01|6.2e+10| 4.985624e+10 -4.865593e+09| 0:0:00| lu 21↙
30
26|0.005|0.005|3.3e-04|7.7e+01|6.2e+10| 5.001468e+10 -5.765039e+09| 0:0:00| lu 30↙
^22
27|0.007|0.098|3.3e-04|7.0e+01|6.4e+10| 4.998507e+10 -8.970596e+09| 0:0:01| lu 30↙
^10
28|0.340|0.287|2.2e-04|5.0e+01|5.9e+10| 4.248034e+10 -6.633453e+09| 0:0:01| lu 30 ^↙
4
29|0.532|0.528|4.2e-05|2.3e+01|4.3e+10| 2.971033e+10 -6.825409e+09| 0:0:01| lu 30 ^↙
9
30|0.615|0.465|4.9e-05|1.3e+01|2.5e+10| 1.581078e+10 -4.945340e+09| 0:0:01| lu 30↙
^28
31|0.047|0.139|2.1e-04|1.1e+01|2.4e+10| 1.562528e+10 -4.306522e+09| 0:0:01| lu 23↙
30
32|0.235|0.367|8.9e-05|6.8e+00|2.1e+10| 1.403964e+10 -3.434919e+09| 0:0:01| lu 30↙
30
33|0.700|0.614|3.8e-04|2.6e+00|8.8e+09| 5.293924e+09 -1.772925e+09| 0:0:01| lu 13↙
^19
34|0.129|0.163|4.9e-04|2.2e+00|8.4e+09| 5.061380e+09 -1.704182e+09| 0:0:01| lu 16↙
30
35|0.096|0.139|8.7e-04|1.9e+00|8.2e+09| 4.920994e+09 -1.654124e+09| 0:0:01| lu 19↙
30
36|0.086|0.108|9.2e-04|1.7e+00|7.9e+09| 4.723676e+09 -1.583482e+09| 0:0:01| lu 30↙
30
37|0.000|0.000|4.4e-04|1.7e+00|7.9e+09| 4.723590e+09 -1.579868e+09| 0:0:01| lu 12 ^↙
2
38|0.029|0.031|9.7e-04|1.6e+00|7.9e+09| 4.691027e+09 -1.585419e+09| 0:0:01| lu 16↙
30
39|0.044|0.062|7.4e-04|1.5e+00|7.8e+09| 4.638151e+09 -1.579432e+09| 0:0:01| lu 17↙
^12
40|0.031|0.058|6.1e-03|1.4e+00|7.7e+09| 4.606654e+09 -1.514194e+09| 0:0:01| lu 30 ^↙
```

```
8
41|0.000|0.000|6.4e-03|1.4e+00|7.7e+09| 4.606606e+09 -1.524888e+09| 0:0:01| lu 13↙
30
42|0.006|0.037|6.2e-03|1.4e+00|7.7e+09| 4.601582e+09 -1.570457e+09| 0:0:01| lu 14↙
^10
43|0.079|0.273|4.3e-03|1.0e+00|7.0e+09| 4.477087e+09 -1.252438e+09| 0:0:01| lu 12↙
^20
44|0.004|0.018|3.0e-03|1.0e+00|7.0e+09| 4.472784e+09 -1.319837e+09| 0:0:01| lu 29↙
30
45|0.031|0.106|4.0e-03|8.9e-01|6.7e+09| 4.431877e+09 -1.199130e+09| 0:0:01| lu 25 ^↙
7
46|0.132|0.225|3.4e-03|6.9e-01|6.3e+09| 4.164527e+09 -1.128996e+09| 0:0:01| lu 30↙
30
47|0.122|0.200|3.1e-03|5.5e-01|6.1e+09| 3.992564e+09 -1.103213e+09| 0:0:01| lu 14↙
^18
48|0.102|0.247|1.7e-03|4.2e-01|5.7e+09| 3.853614e+09 -1.016486e+09| 0:0:01| lu 29↙
30
49|0.011|0.011|3.0e-03|4.1e-01|5.7e+09| 3.844953e+09 -9.603201e+08| 0:0:01| lu 25↙
^16
50|0.001|0.011|3.0e-03|4.1e-01|5.8e+09| 3.840943e+09 -9.785252e+08| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  4.60665379e+09
 dual   objective value = -1.51419380e+09
 gap := trace(XZ)       = 7.68e+09
 relative gap           = 1.25e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 6.07e-03
 rel. dual   infeas     = 1.45e+00
 norm(X), norm(y), norm(Z) = 3.6e+10, 1.5e+09, 2.1e+09
 norm(A), norm(b), norm(C) = 7.2e+08, 1.7e+08, 7.7e+01
 Total CPU time (secs)  = 1.07
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 8.5e-03  0.0e+00  2.1e+00  0.0e+00  1.0e+00  1.3e+00
-----------------------------------------------------------------

ans =

   8.4788e+10

Iteration   6   Total error is: 7.2081

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*****************************************************************
   SDPT3: Infeasible path-following algorithms
*****************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-----------------------------------------------------------------
```

```
 0|0.000|0.000|1.0e+00|4.2e+03|1.1e+10| 1.158517e+08  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.922|6.4e-07|3.3e+02|1.0e+09| 1.109451e+08 -2.550209e+04| 0:0:00| chol  2↙
3
 2|0.391|0.780|3.9e-07|7.3e+01|4.0e+08| 1.250570e+08 -5.106017e+05| 0:0:00| chol  3↙
3
 3|0.578|0.396|1.6e-07|4.4e+01|3.2e+08| 1.312714e+08 -7.519723e+05| 0:0:00| chol  3↙
3
 4|0.177|0.473|1.4e-07|2.3e+01|2.4e+08| 1.316335e+08 -1.307252e+06| 0:0:00| chol  3↙
3
 5|0.260|0.353|1.0e-07|1.5e+01|2.0e+08| 1.282256e+08 -1.886948e+06| 0:0:00| chol  3↙
2
 6|0.128|0.518|8.8e-08|7.2e+00|1.7e+08| 1.248857e+08 -2.879067e+06| 0:0:00| chol  3↙
3
 7|0.343|0.274|5.8e-08|5.2e+00|1.5e+08| 1.139611e+08 -3.606473e+06| 0:0:00| chol  3↙
4
 8|0.086|0.725|5.0e-08|1.4e+00|1.2e+08| 1.101196e+08 -4.083627e+06| 0:0:00| chol  3↙
3
 9|0.219|0.196|4.2e-08|1.2e+00|1.2e+08| 1.033142e+08 -4.887916e+06| 0:0:00| chol  4↙
4
10|0.133|0.697|1.1e-07|3.5e-01|1.0e+08| 9.631014e+07 -2.860031e+06| 0:0:00| chol  4↙
4
11|0.114|0.283|1.4e-07|2.5e-01|1.0e+08| 9.198922e+07 -3.890965e+06| 0:0:00| chol  3↙
3
12|0.124|0.125|1.6e-07|2.2e-01|9.7e+07| 8.736993e+07 -4.493371e+06| 0:0:00| chol  4↙
5
13|0.047|0.376|9.0e-07|1.4e-01|9.2e+07| 8.569526e+07 -2.909996e+06| 0:0:00| chol  4↙
4
14|0.069|0.170|1.5e-06|1.1e-01|9.1e+07| 8.358210e+07 -3.762130e+06| 0:0:00| chol  5↙
5
15|0.065|0.070|1.1e-06|1.1e-01|9.0e+07| 8.150489e+07 -4.218658e+06| 0:0:00| chol  7↙
7
16|0.048|0.080|1.1e-05|9.7e-02|8.9e+07| 8.040053e+07 -4.469802e+06| 0:0:00| chol  7↙
7
17|0.038|0.058|1.8e-05|9.2e-02|8.9e+07| 7.946723e+07 -4.740140e+06| 0:0:00| chol 21↙
*17
18|0.032|0.050|2.2e-05|8.7e-02|8.8e+07| 7.874469e+07 -4.967746e+06| 0:0:00| chol 24↙
27
19|0.027|0.067|2.3e-05|8.1e-02|8.8e+07| 7.816655e+07 -5.181712e+06| 0:0:00| chol 13↙
*21
20|0.028|0.103|2.7e-05|7.3e-02|8.7e+07| 7.756717e+07 -5.335163e+06| 0:0:00| chol  8↙
*17
21|0.034|0.144|3.4e-05|6.3e-02|8.6e+07| 7.689304e+07 -5.152596e+06| 0:0:00| chol  7↙
9
22|0.044|0.031|1.0e-04|6.1e-02|8.6e+07| 7.592362e+07 -5.257977e+06| 0:0:00| chol  6↙
6
23|0.030|0.164|1.0e-04|5.1e-02|8.5e+07| 7.548646e+07 -5.668528e+06| 0:0:00| chol  5↙
5
24|0.105|0.139|1.0e-04|4.4e-02|8.2e+07| 7.196562e+07 -5.770778e+06| 0:0:00| chol *
  warning: symqmr failed: 2.0
  switch to LU factor. lu  8   3
25|0.035|0.084|1.2e-04|4.0e-02|8.1e+07| 7.109556e+07 -6.233596e+06| 0:0:00| lu  9↙
2
26|0.074|0.403|9.2e-05|2.4e-02|7.8e+07| 6.998225e+07 -5.592905e+06| 0:0:00| lu  6↙
```

```
2
27|0.108|0.182|8.8e-05|2.0e-02|7.7e+07| 6.764886e+07 -6.134526e+06| 0:0:00| lu  8↙
2
28|0.117|0.391|1.1e-04|1.2e-02|7.4e+07| 6.576028e+07 -6.732878e+06| 0:0:00| lu  6↙
2
29|0.124|0.659|6.1e-05|4.0e-03|7.0e+07| 6.425984e+07 -4.938738e+06| 0:0:00| lu  5↙
2
30|0.343|0.305|9.9e-05|2.8e-03|6.6e+07| 5.795204e+07 -7.041717e+06| 0:0:00| lu  4↙
2
31|0.430|1.000|4.4e-05|1.8e-05|5.8e+07| 5.153843e+07 -6.388168e+06| 0:0:00| lu  3↙
1
32|1.000|1.000|5.4e-07|8.8e-06|3.7e+07| 2.956301e+07 -7.546529e+06| 0:0:00| lu  2↙
1
33|1.000|1.000|1.1e-06|1.1e-07|1.4e+07| 1.159252e+07 -2.822409e+06| 0:0:00| lu  3↙
1
34|1.000|1.000|3.3e-07|1.6e-07|4.4e+06| 3.434820e+06 -1.000972e+06| 0:0:00| lu  3↙
1
35|1.000|1.000|1.2e-06|6.5e-08|2.0e+06| 1.596029e+06 -4.206055e+05| 0:0:00| lu  3↙
1
36|1.000|1.000|1.4e-07|9.8e-08|6.5e+05| 4.842075e+05 -1.627229e+05| 0:0:00| lu  3↙
1
37|1.000|1.000|8.9e-09|2.7e-08|2.7e+05| 2.091198e+05 -5.938475e+04| 0:0:00| lu  2↙
1
38|1.000|1.000|7.7e-09|1.8e-09|8.5e+04| 6.239368e+04 -2.269139e+04| 0:0:00| lu  2↙
1
39|1.000|1.000|3.2e-09|1.5e-09|3.5e+04| 2.688160e+04 -7.844397e+03| 0:0:00| lu  2↙
1
40|1.000|1.000|1.6e-09|6.3e-10|1.1e+04| 7.793915e+03 -2.966459e+03| 0:0:00| lu  3↙
1
41|1.000|1.000|6.5e-10|3.3e-10|4.4e+03| 3.412503e+03 -1.029468e+03| 0:0:00| lu  3↙
1
42|1.000|1.000|3.2e-10|1.3e-10|1.4e+03| 9.428107e+02 -4.089482e+02| 0:0:00| lu  3↙
1
43|1.000|1.000|2.2e-10|6.4e-11|5.6e+02| 3.996200e+02 -1.653303e+02| 0:0:00| lu  2↙
1
44|1.000|1.000|1.3e-10|4.3e-11|1.7e+02| 7.925334e+01 -8.804484e+01| 0:0:00| lu  3↙
1
45|1.000|1.000|5.7e-11|2.6e-11|7.1e+01| 1.202434e+01 -5.887858e+01| 0:0:00| lu  3↙
1
46|1.000|1.000|8.1e-11|1.1e-11|2.0e+01|-2.959403e+01 -4.946466e+01| 0:0:00| lu  3↙
1
47|1.000|1.000|3.7e-11|1.6e-11|8.7e+00|-3.756497e+01 -4.627866e+01| 0:0:00| lu  3↙
1
48|1.000|1.000|1.6e-11|7.4e-12|2.3e+00|-4.291370e+01 -4.518297e+01| 0:0:00| lu  3↙
1
49|1.000|1.000|2.9e-11|3.1e-12|1.0e+00|-4.382927e+01 -4.487109e+01| 0:0:00| lu  3↙
1
50|0.984|1.000|5.9e-12|4.7e-12|2.5e-01|-4.450114e+01 -4.474823e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
------------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -4.45011416e+01
 dual   objective value = -4.47482258e+01
 gap := trace(XZ)       = 2.47e-01
```

```
 relative gap           = 2.74e-03
 actual relative gap    = 2.74e-03
 rel. primal infeas     = 5.89e-12
 rel. dual   infeas     = 4.72e-12
 norm(X), norm(y), norm(Z) = 1.0e+03, 5.9e+01, 2.3e+01
 norm(A), norm(b), norm(C) = 9.0e+05, 2.4e+05, 7.7e+01
 Total CPU time (secs)  = 0.36
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 8.9e-12  0.0e+00  6.7e-12  0.0e+00  2.7e-03  2.7e-03
------------------------------------------------------------------

ans =

   44.7404

Iteration   7   Total error is: 0.029269

 num. of constraints = 49
 dim. of socp   var  = 50,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.7e+05|6.8e+11| 7.471078e+09  0.000000e+00| 0:0:00| chol  3↙
3
 1|1.000|0.934|6.2e-07|2.4e+04|5.6e+10| 7.148087e+09 -5.097159e+06| 0:0:00| chol 11↙
10
 2|0.309|0.788|4.4e-07|5.1e+03|2.2e+10| 7.750761e+09 -3.283679e+07| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   6
 3|0.475|0.363|2.5e-07|3.2e+03|1.8e+10| 7.881904e+09 -4.912292e+07| 0:0:00| lu 24↙
^19
 4|0.166|0.511|2.0e-07|1.6e+03|1.3e+10| 7.861777e+09 -8.143024e+07| 0:0:00| lu 13↙
4
 5|0.282|0.335|1.4e-07|1.1e+03|1.2e+10| 7.554869e+09 -1.126225e+08| 0:0:00| lu 20↙
7
 6|0.114|0.587|2.2e-07|4.3e+02|9.3e+09| 7.359889e+09 -1.585348e+08| 0:0:00| lu 15↙
30
 7|0.345|0.226|3.7e-07|3.4e+02|8.3e+09| 6.702099e+09 -1.917881e+08| 0:0:00| lu 11↙
5
 8|0.073|0.721|3.5e-07|9.4e+01|7.1e+09| 6.490821e+09 -1.350874e+08| 0:0:00| lu 13↙
5
 9|0.149|0.260|4.6e-07|7.0e+01|6.8e+09| 6.204163e+09 -1.988767e+08| 0:0:00| lu 30↙
6
10|0.156|0.152|6.9e-07|5.9e+01|6.6e+09| 5.891718e+09 -2.295882e+08| 0:0:00| lu 27↙
^15
11|0.030|0.386|4.4e-06|3.6e+01|6.2e+09| 5.756960e+09 -7.451486e+07| 0:0:00| lu 30↙
4
12|0.252|0.276|7.7e-06|2.6e+01|5.8e+09| 5.269876e+09 -1.779542e+08| 0:0:00| lu 30 ^↙
```

```
2
13|0.175|0.181|6.0e-06|2.1e+01|5.5e+09| 4.915538e+09 -2.448428e+08| 0:0:00| lu 12 ^↙
9
14|0.130|0.136|3.0e-06|1.9e+01|5.4e+09| 4.715574e+09 -2.835392e+08| 0:0:00| lu 12 ^↙
7
15|0.094|0.249|2.2e-05|1.4e+01|5.2e+09| 4.580427e+09 -3.131405e+08| 0:0:00| lu 14↙
13
16|0.127|0.158|2.3e-05|1.2e+01|5.1e+09| 4.347374e+09 -3.394799e+08| 0:0:00| lu 30↙
^21
17|0.000|0.000|3.0e-04|1.2e+01|5.1e+09| 4.343189e+09 -3.375288e+08| 0:0:00| lu 30↙
^24
18|0.022|0.052|4.3e-04|1.1e+01|5.0e+09| 4.309902e+09 -3.280813e+08| 0:0:00| lu 26↙
30
19|0.000|0.003|4.4e-04|1.1e+01|5.0e+09| 4.311293e+09 -3.371478e+08| 0:0:00| lu 21 ^↙
9
20|0.068|0.069|2.2e-04|1.0e+01|5.0e+09| 4.247993e+09 -3.766885e+08| 0:0:00| lu 16↙
21
21|0.005|0.062|2.5e-04|9.7e+00|4.9e+09| 4.231482e+09 -3.173224e+08| 0:0:00| lu 18↙
30
22|0.297|0.190|2.2e-04|7.8e+00|4.7e+09| 3.884860e+09 -3.799805e+08| 0:0:00| lu *10↙
^11
23|0.000|0.000|2.1e-04|7.8e+00|4.7e+09| 3.881971e+09 -4.038117e+08| 0:0:00| lu 30↙
30
24|0.007|0.030|1.3e-04|7.6e+00|4.8e+09| 3.839800e+09 -5.527079e+08| 0:0:00| lu 28↙
8
25|0.107|0.212|1.3e-04|6.0e+00|4.6e+09| 3.799837e+09 -3.885562e+08| 0:0:00| lu 26↙
25
26|0.203|0.557|9.9e-05|2.7e+00|4.0e+09| 3.353744e+09 -3.342117e+08| 0:0:00| lu 30↙
30
27|0.160|0.309|8.8e-05|1.8e+00|3.7e+09| 3.080682e+09 -3.637055e+08| 0:0:01| lu 30↙
30
28|0.016|0.035|2.8e-04|1.8e+00|3.7e+09| 3.052385e+09 -3.677239e+08| 0:0:01| lu 26↙
30
29|0.008|0.021|3.1e-04|1.7e+00|3.7e+09| 3.051702e+09 -4.332788e+08| 0:0:01| lu 15↙
^10
30|0.003|0.003|5.2e-04|1.7e+00|3.7e+09| 3.050471e+09 -4.550989e+08| 0:0:01| lu 12↙
^11
31|0.000|0.000|3.0e-04|1.7e+00|3.7e+09| 3.037088e+09 -4.308812e+08| 0:0:01| lu 30 ^↙
8
32|0.029|0.034|3.3e-04|1.7e+00|3.7e+09| 3.019836e+09 -4.516211e+08| 0:0:01| lu 30↙
^12
33|0.150|0.293|2.0e-04|1.2e+00|3.6e+09| 2.830806e+09 -5.191758e+08| 0:0:01| lu 30↙
6
34|0.241|0.535|1.9e-04|5.5e-01|3.0e+09| 2.406835e+09 -3.669413e+08| 0:0:01| lu 14↙
^11
35|0.026|0.021|2.1e-04|5.4e-01|3.2e+09| 2.420720e+09 -3.424759e+08| 0:0:01| lu 18↙
5
36|0.354|0.657|3.3e-04|1.8e-01|2.4e+09| 1.899827e+09 -3.421687e+08| 0:0:01| lu 30 ^↙
8
37|0.300|0.360|2.8e-04|1.2e-01|2.0e+09| 1.523789e+09 -3.203155e+08| 0:0:01| lu 19↙
^10
38|0.163|0.200|7.2e-04|9.4e-02|1.9e+09| 1.438372e+09 -3.106655e+08| 0:0:01| lu 12 ^↙
6
39|0.016|0.082|5.7e-04|8.6e-02|1.9e+09| 1.426873e+09 -2.841250e+08| 0:0:01| lu 12↙
```

```
^11
40|0.049|0.257|4.4e-04|6.4e-02|1.8e+09| 1.414073e+09 -2.800996e+08| 0:0:01| lu 21↙
^25
41|0.002|0.001|8.8e-04|6.4e-02|1.8e+09| 1.421266e+09 -2.820441e+08| 0:0:01| lu 27↙
^13
42|0.000|0.003|2.0e-03|6.4e-02|1.9e+09| 1.411952e+09 -2.942730e+08| 0:0:01| lu 23↙
^22
43|0.236|0.239|1.2e-03|4.9e-02|1.8e+09| 1.285661e+09 -3.016333e+08| 0:0:01| lu 25↙
^21
44|0.091|0.258|2.8e-03|3.6e-02|1.8e+09| 1.268874e+09 -3.106066e+08| 0:0:01| lu 14↙
30
45|0.070|0.032|7.7e-03|3.5e-02|1.9e+09| 1.268905e+09 -2.861806e+08| 0:0:01| lu 30↙
^23
46|0.005|0.009|8.1e-03|3.5e-02|2.1e+09| 1.283497e+09 -2.954145e+08| 0:0:01| lu 30 ^↙
3
47|0.273|0.065|6.3e-03|3.3e-02|2.3e+09| 1.236504e+09 -3.064288e+08| 0:0:01| lu 30↙
^16
48|0.036|0.196|1.0e-02|2.6e-02|2.7e+09| 1.223987e+09 -6.098741e+08| 0:0:01| lu 17↙
4
49|1.000|0.820|1.4e-04|4.8e-03|1.2e+09| 6.658761e+08 -2.641836e+08| 0:0:01| lu 14↙
7
50|1.000|1.000|9.4e-04|2.8e-05|4.5e+08| 3.365185e+08 -1.071556e+08| 0:0:01|
  sqlp stop: maximum number of iterations reached
------------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  2.83080618e+09
 dual   objective value = -5.19175847e+08
 gap := trace(XZ)       = 3.60e+09
 relative gap           = 1.07e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 1.99e-04
 rel. dual   infeas     = 1.18e+00
 norm(X), norm(y), norm(Z) = 2.6e+09, 5.2e+08, 7.3e+08
 norm(A), norm(b), norm(C) = 6.5e+07, 1.3e+07, 7.7e+01
 Total CPU time (secs)  = 0.98
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 2.6e-04  0.0e+00  1.7e+00  0.0e+00  1.0e+00  1.1e+00
------------------------------------------------------------------

ans =

   2.3329e+10

Iteration   8   Total error is: 4.776
The total representation error of the testing signals is: 0.0081169
>>
```