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

 num. of constraints = 61
 dim. of socp   var  = 62,   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|1.1e+00|2.9e+01|3.6e+06| 2.222924e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.970|7.7e-06|9.6e-01|1.4e+05| 2.208977e+04 -1.016773e+02| 0:0:00| chol  1↙
1
 2|0.513|0.906|3.7e-06|1.2e-01|4.0e+04| 2.426549e+04 -1.705511e+02| 0:0:00| chol  1↙
1
 3|1.000|1.000|1.8e-06|1.0e-02|1.5e+04| 1.386852e+04 -1.956973e+02| 0:0:00| chol  1↙
1
 4|0.955|0.961|8.3e-07|3.3e-03|6.7e+02| 4.732889e+02 -1.814095e+02| 0:0:00| chol  1↙
1
 5|0.135|0.795|8.6e-07|9.1e-04|6.0e+02| 4.710290e+02 -1.277972e+02| 0:0:00| chol  1↙
1
 6|0.635|0.976|3.2e-07|5.1e-05|4.9e+02| 3.939213e+02 -9.748073e+01| 0:0:00| chol  1↙
1
 7|0.813|1.000|6.3e-08|3.1e-06|3.4e+02| 2.412005e+02 -9.699265e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|5.5e-10|3.1e-07|1.8e+02| 1.070249e+02 -7.444877e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.6e-10|3.0e-08|8.5e+01| 1.820184e+01 -6.671409e+01| 0:0:00| chol  1↙
1
10|1.000|1.000|1.3e-13|3.0e-09|3.5e+01|-2.292741e+01 -5.765464e+01| 0:0:00| chol  1↙
1
11|1.000|1.000|2.0e-13|3.0e-10|1.4e+01|-4.096489e+01 -5.480424e+01| 0:0:00| chol  1↙
1
12|1.000|1.000|3.8e-14|3.1e-11|5.3e+00|-4.732574e+01 -5.265395e+01| 0:0:00| chol  1↙
1
13|1.000|1.000|1.0e-14|4.0e-12|1.9e+00|-5.015041e+01 -5.205004e+01| 0:0:00| chol  1↙
1
14|1.000|1.000|2.0e-14|1.3e-12|7.3e-01|-5.098941e+01 -5.171631e+01| 0:0:00| chol  1↙
1
15|1.000|1.000|4.4e-14|1.0e-12|2.3e-01|-5.138848e+01 -5.162158e+01| 0:0:00| chol  1↙
1
16|1.000|1.000|1.2e-13|1.0e-12|9.2e-02|-5.148730e+01 -5.157969e+01| 0:0:00| chol  1↙
1
17|1.000|1.000|1.5e-14|1.0e-12|2.6e-02|-5.154070e+01 -5.156687e+01| 0:0:00| chol  1↙
1
18|1.000|1.000|2.0e-12|1.0e-12|1.1e-02|-5.155187e+01 -5.156238e+01| 0:0:01| chol  1↙
1
19|0.982|0.973|3.6e-12|1.0e-12|2.3e-03|-5.155858e+01 -5.156084e+01| 0:0:01| chol  2↙
2
```

```
20|0.856|1.000|1.3e-12|1.0e-12|1.1e-03|-5.155951e+01 -5.156062e+01| 0:0:01| chol  1↙
2
21|0.999|0.888|9.4e-13|1.1e-12|1.9e-04|-5.156033e+01 -5.156052e+01| 0:0:01| chol  2↙
2
22|0.735|1.000|1.1e-12|1.0e-12|1.0e-04|-5.156040e+01 -5.156050e+01| 0:0:01| chol  2↙
2
23|0.994|0.743|1.1e-12|1.3e-12|2.0e-05|-5.156048e+01 -5.156050e+01| 0:0:01| chol  2↙
2
24|1.000|0.972|2.7e-12|1.0e-12|4.9e-06|-5.156049e+01 -5.156050e+01| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -5.15604944e+01
 dual   objective value = -5.15604994e+01
 gap := trace(XZ)       = 4.94e-06
 relative gap           = 4.74e-08
 actual relative gap    = 4.74e-08
 rel. primal infeas     = 2.68e-12
 rel. dual   infeas     = 1.04e-12
 norm(X), norm(y), norm(Z) = 9.0e-01, 5.2e+01, 2.0e+01
 norm(A), norm(b), norm(C) = 5.7e+02, 1.2e+01, 7.7e+01
 Total CPU time (secs)  = 0.54
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 5.7e-12  0.0e+00  1.5e-12  0.0e+00  4.7e-08  4.7e-08
-----------------------------------------------------------------

ans =

   51.5605


 num. of constraints = 61
 dim. of socp   var  = 62,   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|5.2e+04|1.4e+11| 8.918608e+08  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.976|2.0e-07|1.3e+03|5.0e+09| 8.693590e+08 -9.985870e+05| 0:0:00| chol 20↙
30
 2|0.918|0.688|4.2e-06|3.9e+02|2.5e+09| 8.749254e+08 -2.041610e+06| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 14  17
 3|0.243|0.212|2.9e-06|3.1e+02|2.2e+09| 8.750576e+08 -2.972316e+06| 0:0:00| lu 25↙
^11
 4|0.000|0.000|2.9e-06|3.1e+02|2.2e+09| 8.751145e+08 -3.333855e+06| 0:0:00| lu 30↙
30
 5|0.002|0.003|2.9e-06|3.1e+02|2.2e+09| 8.755231e+08 -3.355955e+06| 0:0:00| lu 30↙
```

```
30
 6|0.000|0.001|4.0e-06|3.1e+02|2.2e+09| 8.754678e+08 -2.850819e+06| 0:0:00| lu 29 ^↙
8
 7|0.000|0.000|4.0e-06|3.1e+02|2.2e+09| 8.754520e+08 -2.785484e+06| 0:0:00| lu 20↙
^15
 8|0.000|0.001|4.0e-06|3.1e+02|2.2e+09| 8.757098e+08 -3.203638e+06| 0:0:00| lu 22↙
^18
 9|0.007|0.006|4.9e-06|3.0e+02|2.2e+09| 8.765083e+08 -3.118483e+06| 0:0:00| lu 18↙
8
10|0.022|0.170|4.7e-06|2.5e+02|2.0e+09| 8.819390e+08 -5.200942e+06| 0:0:00| lu 30↙
8
11|0.038|0.086|4.7e-06|2.3e+02|1.9e+09| 8.830770e+08 -6.160473e+06| 0:0:00| lu 25 ^↙
7
12|0.047|0.117|4.9e-06|2.0e+02|1.8e+09| 8.916101e+08 -6.049634e+06| 0:0:00| lu 30↙
3
13|0.097|0.507|4.6e-06|1.0e+02|1.3e+09| 8.799347e+08 -6.218500e+06| 0:0:00| lu 30↙
4
14|0.494|0.331|4.7e-06|6.7e+01|1.1e+09| 8.094425e+08 -6.186384e+06| 0:0:00| lu 19↙
4
15|0.195|0.510|3.6e-06|3.3e+01|9.2e+08| 7.715545e+08 -1.067704e+07| 0:0:00| lu 14↙
5
16|0.526|0.519|3.2e-06|1.6e+01|6.6e+08| 5.821013e+08 -1.354320e+07| 0:0:00| lu 27↙
8
17|0.391|0.371|2.2e-06|1.0e+01|5.7e+08| 5.149014e+08 -1.596325e+07| 0:0:00| lu 13↙
30
18|0.238|0.496|2.7e-06|5.0e+00|5.2e+08| 4.789959e+08 -1.554427e+07| 0:0:00| lu 21↙
15
19|0.241|0.267|3.7e-06|3.7e+00|4.8e+08| 4.383643e+08 -1.699151e+07| 0:0:00| lu 30↙
30
20|0.052|0.096|2.0e-05|3.3e+00|4.7e+08| 4.306467e+08 -1.542100e+07| 0:0:00| lu 30↙
^11
21|0.107|0.161|1.6e-05|2.8e+00|4.7e+08| 4.245973e+08 -1.872756e+07| 0:0:00| lu 30↙
^17
22|0.006|0.011|9.7e-05|2.8e+00|4.6e+08| 4.209616e+08 -1.821656e+07| 0:0:00| lu 20↙
^11
23|0.000|0.000|1.2e-04|2.8e+00|4.6e+08| 4.202386e+08 -1.815731e+07| 0:0:00| lu 12↙
30
24|0.000|0.003|1.9e-04|2.8e+00|4.6e+08| 4.206093e+08 -1.897650e+07| 0:0:00| lu 30↙
^27
25|0.000|0.000|1.8e-04|2.8e+00|4.6e+08| 4.205656e+08 -1.919213e+07| 0:0:00| lu 30↙
^10
26|0.000|0.000|1.9e-04|2.8e+00|4.6e+08| 4.205643e+08 -1.910390e+07| 0:0:00| lu 30↙
^19
27|0.000|0.000|1.7e-04|2.8e+00|4.7e+08| 4.211561e+08 -2.298421e+07| 0:0:01| lu 21↙
30
28|0.005|0.011|2.0e-04|2.7e+00|4.7e+08| 4.187645e+08 -2.299003e+07| 0:0:01| lu 19↙
30
29|0.001|0.002|1.7e-04|2.7e+00|4.7e+08| 4.199316e+08 -2.262600e+07| 0:0:01| lu 12↙
^15
30|0.000|0.000|1.6e-04|2.7e+00|4.7e+08| 4.196268e+08 -2.045567e+07| 0:0:01| lu 22 ^↙
8
31|0.039|0.061|1.4e-04|2.6e+00|4.7e+08| 4.166370e+08 -2.352050e+07| 0:0:01| lu 15↙
30
32|0.001|0.000|1.2e-04|2.6e+00|4.6e+08| 4.165560e+08 -2.373978e+07| 0:0:01| lu 24↙
```

```
^20
33|0.000|0.000|1.4e-04|2.6e+00|4.6e+08| 4.167243e+08 -2.346789e+07| 0:0:01| lu 24↙
30
34|0.041|0.053|8.6e-05|2.4e+00|4.7e+08| 4.148477e+08 -3.069979e+07| 0:0:01| lu 16↙
5
35|0.233|0.293|6.4e-05|1.7e+00|4.5e+08| 3.856817e+08 -3.238110e+07| 0:0:01| lu 28↙
4
36|0.735|0.653|2.8e-05|5.9e-01|2.9e+08| 2.405992e+08 -2.596548e+07| 0:0:01| lu 15↙
5
37|0.519|0.475|1.4e-05|3.1e-01|2.2e+08| 1.753456e+08 -2.371490e+07| 0:0:01| lu 29↙
11
38|0.291|0.580|1.9e-05|1.3e-01|1.9e+08| 1.607206e+08 -1.725130e+07| 0:0:01| lu 22↙
18
39|0.304|0.264|1.5e-05|9.6e-02|1.7e+08| 1.394296e+08 -1.763365e+07| 0:0:01| lu 30↙
30
40|0.007|0.008|3.0e-04|9.6e-02|1.7e+08| 1.396461e+08 -1.579446e+07| 0:0:01| lu 30↙
26
41|0.075|0.101|3.1e-04|8.6e-02|1.7e+08| 1.359737e+08 -1.852382e+07| 0:0:01| lu 30↙
6
42|0.232|0.383|2.2e-04|5.3e-02|1.6e+08| 1.302401e+08 -1.507365e+07| 0:0:01| lu 30↙
4
43|0.300|1.000|1.6e-04|9.9e-06|1.1e+08| 9.960870e+07 -7.911602e+06| 0:0:01| lu 30↙
5
44|1.000|0.780|4.4e-05|1.7e-05|7.8e+07| 6.643557e+07 -1.152479e+07| 0:0:01| lu 15↙
5
45|0.476|0.871|1.0e-04|1.1e-05|7.1e+07| 4.998147e+07 -2.071358e+07| 0:0:01| lu  8↙
3
46|0.799|0.617|7.4e-06|1.7e-05|5.3e+07| 4.547317e+07 -7.418975e+06| 0:0:01| lu  6↙
3
47|0.872|1.000|5.3e-06|1.5e-06|1.2e+07| 8.534563e+06 -3.423915e+06| 0:0:01| lu  6↙
2
48|1.000|1.000|1.5e-06|1.1e-06|5.4e+06| 4.569381e+06 -7.968641e+05| 0:0:01| lu  5↙
2
49|0.901|1.000|1.9e-07|2.9e-07|1.7e+06| 1.171176e+06 -5.505342e+05| 0:0:01| lu  7↙
2
50|1.000|1.000|5.3e-08|3.8e-08|7.0e+05| 5.672745e+05 -1.359537e+05| 0:0:01|
  sqlp stop: maximum number of iterations reached
------------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  2.40599184e+08
 dual   objective value = -2.59654834e+07
 gap := trace(XZ)       = 2.89e+08
 relative gap           = 1.08e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 2.81e-05
 rel. dual   infeas     = 5.94e-01
 norm(X), norm(y), norm(Z) = 6.2e+07, 2.6e+07, 3.7e+07
 norm(A), norm(b), norm(C) = 7.4e+06, 2.6e+06, 7.7e+01
 Total CPU time (secs)  = 0.96
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 6.1e-05  0.0e+00  8.5e-01  0.0e+00  1.0e+00  1.1e+00
------------------------------------------------------------------
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ans =

   5.7211e+08

Iteration   2   Total error is: 1.0945

 num. of constraints = 61
 dim. of socp   var  = 62,   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|1.3e+02|4.4e+08| 2.812984e+06  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.971|9.2e-07|3.7e+00|1.8e+07| 2.742612e+06 -1.810382e+03| 0:0:00| chol  2↙
1
 2|0.713|0.727|3.0e-07|1.0e+00|8.3e+06| 2.893671e+06 -6.936863e+03| 0:0:00| chol  1↙
1
 3|0.495|0.464|1.7e-07|5.6e-01|6.1e+06| 2.885470e+06 -1.244616e+04| 0:0:00| chol  1↙
1
 4|0.226|0.465|1.6e-07|3.0e-01|4.8e+06| 2.849699e+06 -2.157364e+04| 0:0:00| chol  1↙
1
 5|0.258|0.392|1.2e-07|1.9e-01|4.0e+06| 2.740875e+06 -3.148815e+04| 0:0:00| chol  1↙
2
 6|0.165|0.493|9.5e-08|9.5e-02|3.3e+06| 2.637464e+06 -4.640123e+04| 0:0:00| chol  2↙
2
 7|0.320|0.366|7.3e-08|6.1e-02|2.9e+06| 2.389928e+06 -5.833045e+04| 0:0:00| chol  2↙
2
 8|0.151|0.676|8.8e-08|2.0e-02|2.5e+06| 2.274135e+06 -7.525229e+04| 0:0:00| chol  2↙
1
 9|0.552|0.319|4.3e-08|1.4e-02|2.0e+06| 1.811310e+06 -8.161543e+04| 0:0:00| chol  2↙
2
10|0.244|1.000|3.3e-07|3.6e-04|1.7e+06| 1.648512e+06 -7.719523e+04| 0:0:00| chol  2↙
2
11|1.000|1.000|1.4e-07|1.8e-04|1.3e+06| 1.170038e+06 -8.766895e+04| 0:0:00| chol  2↙
2
12|1.000|1.000|8.4e-08|9.0e-05|7.1e+05| 6.402578e+05 -6.622619e+04| 0:0:00| chol  2↙
2
13|1.000|1.000|3.9e-08|4.5e-05|3.0e+05| 2.639316e+05 -3.964396e+04| 0:0:00| chol  2↙
2
14|1.000|1.000|1.9e-08|2.3e-05|1.3e+05| 1.145164e+05 -1.964154e+04| 0:0:00| chol  2↙
2
15|1.000|1.000|1.4e-08|1.1e-05|6.1e+04| 5.030211e+04 -1.073477e+04| 0:0:00| chol  1↙
2
16|1.000|1.000|2.6e-09|5.6e-06|2.4e+04| 1.926590e+04 -4.635590e+03| 0:0:00| chol  1↙
1
17|1.000|1.000|1.3e-09|2.8e-06|9.5e+03| 7.437469e+03 -2.044974e+03| 0:0:00| chol  1↙
1
18|1.000|1.000|8.8e-10|1.4e-06|3.3e+03| 2.529684e+03 -7.573925e+02| 0:0:00| chol  2↙
1
```

```
19|1.000|1.000|1.2e-10|4.2e-07|1.2e+03| 9.193351e+02 -3.190017e+02| 0:0:00| chol  1↙
1
20|1.000|1.000|2.4e-10|4.2e-08|4.0e+02| 2.738724e+02 -1.287874e+02| 0:0:00| chol  1↙
2
21|1.000|1.000|2.0e-12|4.3e-09|1.5e+02| 7.649000e+01 -7.424792e+01| 0:0:00| chol  1↙
1
22|1.000|1.000|3.3e-11|4.2e-10|4.6e+01|-4.570824e+00 -5.105658e+01| 0:0:00| chol  1↙
1
23|1.000|1.000|3.8e-12|4.4e-11|1.7e+01|-2.821026e+01 -4.530061e+01| 0:0:00| chol  1↙
1
24|1.000|1.000|6.3e-12|5.2e-12|5.1e+00|-3.782395e+01 -4.288110e+01| 0:0:00| chol  2↙
1
25|1.000|1.000|5.5e-11|1.7e-12|1.8e+00|-4.057793e+01 -4.234292e+01| 0:0:00| chol  1↙
1
26|1.000|1.000|6.8e-12|1.9e-12|5.5e-01|-4.157945e+01 -4.212793e+01| 0:0:00| chol  1↙
1
27|1.000|1.000|5.4e-12|1.4e-12|1.7e-01|-4.191083e+01 -4.207807e+01| 0:0:00| chol  2↙
1
28|1.000|1.000|1.1e-11|1.1e-12|6.1e-02|-4.200068e+01 -4.206143e+01| 0:0:00| chol  2↙
2
29|0.974|1.000|3.4e-12|1.6e-12|1.3e-02|-4.204309e+01 -4.205615e+01| 0:0:00| chol  2↙
2
30|0.905|1.000|1.3e-11|1.0e-12|6.1e-03|-4.204930e+01 -4.205537e+01| 0:0:00| chol  2↙
2
31|0.972|0.953|1.6e-11|1.5e-12|9.4e-04|-4.205403e+01 -4.205497e+01| 0:0:00| chol  3↙
3
32|0.589|1.000|1.0e-11|2.3e-12|5.5e-04|-4.205438e+01 -4.205493e+01| 0:0:00| chol  3↙
3
33|0.976|0.990|1.7e-11|2.1e-12|1.3e-04|-4.205479e+01 -4.205492e+01| 0:0:00| chol  5↙
4
34|0.683|0.856|3.4e-11|3.4e-12|6.9e-05|-4.205485e+01 -4.205492e+01| 0:0:00| chol  9↙
15
35|0.833|0.942|2.9e-11|4.9e-12|3.6e-05|-4.205488e+01 -4.205492e+01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   1
36|1.000|1.000|2.7e-10|5.8e-12|1.0e-05|-4.205491e+01 -4.205492e+01| 0:0:00| lu 19↙
1
37|0.968|0.959|2.7e-10|8.9e-12|1.6e-06|-4.205492e+01 -4.205492e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 37
 primal objective value = -4.20549156e+01
 dual   objective value = -4.20549172e+01
 gap := trace(XZ)       = 1.64e-06
 relative gap           = 1.92e-08
 actual relative gap    = 1.85e-08
 rel. primal infeas     = 2.70e-10
 rel. dual   infeas     = 8.93e-12
 norm(X), norm(y), norm(Z) = 3.2e+01, 6.1e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 2.1e+04, 9.1e+03, 7.7e+01
 Total CPU time (secs)  = 0.28
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 6.5e-10  0.0e+00  1.3e-11  0.0e+00  1.8e-08  1.9e-08
```

```
-----------------------------------------------------------------

ans =

   42.0549

Iteration   3   Total error is: 0.029201

 num. of constraints = 61
 dim. of socp   var  = 62,   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|5.4e+03|1.5e+10| 9.554946e+07  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.966|5.0e-07|1.8e+02|6.8e+08| 9.313175e+07 -9.332941e+04| 0:0:00| chol  4↙
3
 2|0.678|0.757|1.9e-07|4.5e+01|3.0e+08| 1.023661e+08 -2.958334e+05| 0:0:00| chol  3↙
3
 3|0.505|0.442|9.2e-08|2.5e+01|2.2e+08| 1.024089e+08 -4.930497e+05| 0:0:00| chol  3↙
3
 4|0.229|0.497|7.0e-08|1.2e+01|1.7e+08| 1.013783e+08 -8.046232e+05| 0:0:00| chol  4↙
3
 5|0.304|0.384|4.8e-08|7.7e+00|1.4e+08| 9.670709e+07 -1.101708e+06| 0:0:00| chol  4↙
4
 6|0.178|0.571|4.0e-08|3.3e+00|1.1e+08| 9.266707e+07 -1.418470e+06| 0:0:00| chol  4↙
4
 7|0.370|0.274|2.4e-08|2.4e+00|9.9e+07| 8.282811e+07 -1.677286e+06| 0:0:00| chol  5↙
5
 8|0.118|0.717|3.1e-08|6.8e-01|8.6e+07| 7.945359e+07 -1.380649e+06| 0:0:00| chol  3↙
4
 9|0.169|0.200|2.7e-08|5.4e-01|8.2e+07| 7.584627e+07 -1.692149e+06| 0:0:00| chol  4↙
4
10|0.080|0.505|6.2e-08|2.7e-01|7.8e+07| 7.372154e+07 -1.481715e+06| 0:0:00| chol  4↙
4
11|0.053|0.187|4.8e-08|2.2e-01|7.7e+07| 7.228353e+07 -1.313668e+06| 0:0:00| chol  4↙
3
12|0.201|0.318|6.2e-08|1.5e-01|7.2e+07| 6.720152e+07 -1.974338e+06| 0:0:00| chol  4↙
4
13|0.186|0.200|1.4e-07|1.2e-01|6.9e+07| 6.344299e+07 -2.394791e+06| 0:0:00| chol  6↙
6
14|0.191|0.319|3.5e-07|8.1e-02|6.6e+07| 6.083638e+07 -2.688497e+06| 0:0:00| chol  5↙
5
15|0.146|0.331|2.2e-07|5.4e-02|6.2e+07| 5.714447e+07 -2.903991e+06| 0:0:00| chol  6↙
6
16|0.162|0.400|5.5e-07|3.3e-02|5.9e+07| 5.450330e+07 -3.049717e+06| 0:0:00| chol  6↙
5
17|0.190|0.438|1.2e-06|1.8e-02|5.6e+07| 5.186163e+07 -3.169993e+06| 0:0:00| chol  6↙
6
```

```
18|0.250|0.699|6.3e-07|5.5e-03|5.3e+07| 4.872113e+07 -3.262561e+06| 0:0:00| chol  5↙
6
19|0.304|1.000|4.7e-06|8.3e-07|4.9e+07| 4.574525e+07 -3.090650e+06| 0:0:00| chol  3↙
5
20|0.596|0.914|5.6e-06|3.2e-07|4.3e+07| 3.874814e+07 -4.424271e+06| 0:0:00| chol  3↙
4
21|1.000|1.000|2.0e-05|2.9e-07|2.8e+07| 2.529624e+07 -3.002007e+06| 0:0:00| chol  3↙
4
22|0.976|1.000|9.3e-06|4.3e-07|1.3e+07| 1.074154e+07 -2.018182e+06| 0:0:00| chol  3↙
3
23|1.000|1.000|7.8e-08|6.4e-07|5.5e+06| 4.689927e+06 -7.802452e+05| 0:0:00| chol  3↙
3
24|1.000|1.000|7.0e-07|1.6e-08|2.0e+06| 1.589443e+06 -3.868855e+05| 0:0:00| chol  2↙
3
25|1.000|1.000|4.0e-08|2.4e-08|8.2e+05| 6.732798e+05 -1.478555e+05| 0:0:00| chol  3↙
3
26|1.000|1.000|2.2e-08|7.9e-09|3.0e+05| 2.299098e+05 -7.084039e+04| 0:0:00| chol  2↙
3
27|1.000|1.000|5.0e-09|4.5e-09|1.2e+05| 9.771800e+04 -2.471551e+04| 0:0:00| chol  3↙
3
28|1.000|1.000|5.8e-09|1.0e-09|4.3e+04| 3.205059e+04 -1.135031e+04| 0:0:00| chol  3↙
3
29|1.000|1.000|1.9e-09|1.2e-09|1.7e+04| 1.323779e+04 -3.691913e+03| 0:0:00| chol  2↙
3
30|1.000|1.000|1.1e-09|3.8e-10|5.6e+03| 4.005127e+03 -1.557248e+03| 0:0:00| chol  2↙
3
31|1.000|1.000|4.4e-10|2.3e-10|2.2e+03| 1.690912e+03 -5.270897e+02| 0:0:00| chol  2↙
3
32|1.000|1.000|4.5e-10|8.9e-11|6.9e+02| 4.578544e+02 -2.338828e+02| 0:0:00| chol  2↙
2
33|1.000|1.000|2.6e-10|9.0e-11|2.8e+02| 1.781275e+02 -1.053149e+02| 0:0:00| chol  2↙
3
34|1.000|1.000|1.6e-10|5.2e-11|8.5e+01| 1.689347e+01 -6.765347e+01| 0:0:00| chol  3↙
2
35|1.000|1.000|2.7e-10|3.2e-11|3.6e+01|-1.690865e+01 -5.243004e+01| 0:0:00| chol  2↙
2
36|1.000|1.000|2.5e-10|4.8e-11|1.0e+01|-3.770456e+01 -4.777732e+01| 0:0:00| chol  3↙
3
37|1.000|1.000|2.3e-11|5.1e-11|4.4e+00|-4.173614e+01 -4.609712e+01| 0:0:00| chol  3↙
2
38|0.999|1.000|2.0e-11|4.6e-12|1.1e+00|-4.440452e+01 -4.553945e+01| 0:0:00| chol  3↙
3
39|1.000|1.000|8.3e-12|3.9e-12|5.1e-01|-4.486983e+01 -4.537742e+01| 0:0:00| chol  2↙
2
40|0.978|1.000|1.3e-11|1.7e-12|1.2e-01|-4.519714e+01 -4.531395e+01| 0:0:00| chol  3↙
3
41|1.000|1.000|2.4e-11|2.5e-12|5.0e-02|-4.525112e+01 -4.530155e+01| 0:0:00| chol  2↙
3
42|0.959|0.959|8.5e-12|3.9e-12|9.2e-03|-4.528657e+01 -4.529578e+01| 0:0:00| chol  5↙
5
43|0.818|1.000|2.9e-11|1.7e-12|4.4e-03|-4.529069e+01 -4.529508e+01| 0:0:00| chol  9↙
8
44|1.000|1.000|1.7e-11|2.6e-12|9.6e-04|-4.529386e+01 -4.529482e+01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
```

```
  switch to LU factor. lu 18   1
45|0.890|0.995|2.3e-10|3.5e-12|2.8e-04|-4.529450e+01 -4.529477e+01| 0:0:00| lu 30↙
7
46|0.625|1.000|6.4e-10|5.2e-12|1.8e-04|-4.529459e+01 -4.529477e+01| 0:0:00| lu 26↙
^15
47|0.953|0.988|1.2e-08|7.9e-12|4.9e-05|-4.529473e+01 -4.529476e+01| 0:0:00| lu 12 ^↙
2
48|0.910|1.000|3.0e-09|1.2e-11|2.5e-05|-4.529474e+01 -4.529476e+01| 0:0:00| lu 30↙
3
49|0.985|1.000|8.0e-10|1.8e-11|3.6e-06|-4.529477e+01 -4.529476e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 49
 primal objective value = -4.52947658e+01
 dual   objective value = -4.52947624e+01
 gap := trace(XZ)       = 3.60e-06
 relative gap           = 3.93e-08
 actual relative gap    = -3.62e-08
 rel. primal infeas     = 8.00e-10
 rel. dual   infeas     = 1.76e-11
 norm(X), norm(y), norm(Z) = 5.6e+02, 5.8e+01, 2.2e+01
 norm(A), norm(b), norm(C) = 8.3e+05, 2.1e+05, 7.7e+01
 Total CPU time (secs)  = 0.38
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.3e-09  0.0e+00  2.5e-11  0.0e+00  -3.6e-08  3.9e-08
-------------------------------------------------------------------

ans =

   45.2948

Iteration   4   Total error is: 0.029207

 num. of constraints = 61
 dim. of socp   var  = 62,   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|5.9e+04|1.5e+11| 9.797372e+08  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.954|3.9e-07|2.7e+03|8.7e+09| 9.548811e+08 -8.062183e+05| 0:0:00| chol 12↙
18
 2|0.479|0.766|1.9e-07|6.4e+02|3.5e+09| 1.070616e+09 -4.150279e+06| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 12 ^30
 3|0.482|0.407|2.9e-07|3.8e+02|2.8e+09| 1.112390e+09 -6.615325e+06| 0:0:00| lu 13↙
30
 4|0.174|0.460|4.5e-07|2.0e+02|2.1e+09| 1.117851e+09 -1.132042e+07| 0:0:00| lu 16↙
```

```
^22
 5|0.192|0.367|8.2e-07|1.3e+02|1.8e+09| 1.100200e+09 -1.611779e+07| 0:0:00| lu 24↙
30
 6|0.153|0.369|1.2e-06|8.1e+01|1.5e+09| 1.067331e+09 -2.171770e+07| 0:0:00| lu 13↙
30
 7|0.092|0.172|8.4e-06|6.7e+01|1.4e+09| 1.041533e+09 -2.328845e+07| 0:0:00| lu 30↙
^24
 8|0.038|0.035|2.1e-05|6.5e+01|1.4e+09| 1.043715e+09 -2.377047e+07| 0:0:00| lu 13↙
^27
 9|0.018|0.031|2.4e-05|6.3e+01|1.4e+09| 1.035623e+09 -2.371398e+07| 0:0:00| lu 30 ^↙
6
10|0.006|0.054|2.6e-05|6.0e+01|1.4e+09| 1.032648e+09 -2.846534e+07| 0:0:00| lu 30↙
8
11|0.205|0.072|1.7e-05|5.5e+01|1.4e+09| 1.050379e+09 -2.781824e+07| 0:0:00| lu 13↙
3
12|0.121|0.420|1.4e-05|3.2e+01|1.1e+09| 9.069575e+08 -2.213898e+07| 0:0:00| lu 21↙
4
13|0.645|0.576|1.7e-05|1.4e+01|7.7e+08| 6.541125e+08 -3.040051e+07| 0:0:00| lu 26↙
5
14|0.416|0.461|1.0e-05|7.3e+00|6.1e+08| 5.143247e+08 -4.023021e+07| 0:0:00| lu 24↙
^17
15|0.387|0.433|8.5e-06|4.2e+00|5.6e+08| 4.511802e+08 -4.825074e+07| 0:0:00| lu 30↙
6
16|0.203|0.318|2.4e-05|2.8e+00|5.2e+08| 4.110159e+08 -4.517154e+07| 0:0:00| lu 30↙
9
17|0.448|0.324|2.5e-05|1.9e+00|4.6e+08| 3.505029e+08 -4.897091e+07| 0:0:00| lu 14↙
^12
18|0.230|0.199|5.0e-05|1.5e+00|4.4e+08| 3.236474e+08 -5.843953e+07| 0:0:00| lu 30 ^↙
6
19|0.221|0.237|1.4e-04|1.2e+00|4.2e+08| 3.056530e+08 -5.331912e+07| 0:0:00| lu 30 ^↙
6
20|0.047|0.078|8.4e-05|1.1e+00|4.1e+08| 2.996982e+08 -5.722026e+07| 0:0:00| lu 13↙
30
21|0.000|0.000|8.1e-05|1.1e+00|4.1e+08| 2.997665e+08 -5.694636e+07| 0:0:00| lu 30↙
^27
22|0.011|0.031|8.4e-05|1.0e+00|4.1e+08| 3.010073e+08 -6.263373e+07| 0:0:00| lu 15↙
30
23|0.000|0.000|9.5e-05|1.0e+00|4.1e+08| 2.999289e+08 -6.015039e+07| 0:0:00| lu 17 ^↙
7
24|0.002|0.002|1.1e-04|1.0e+00|4.1e+08| 3.003565e+08 -6.242776e+07| 0:0:00| lu 12↙
^24
25|0.000|0.000|1.2e-04|1.0e+00|4.1e+08| 3.007695e+08 -7.120601e+07| 0:0:00| lu 27↙
30
26|0.088|0.090|1.8e-04|9.5e-01|4.1e+08| 2.912015e+08 -6.083402e+07| 0:0:01| lu 16 ^↙
8
27|0.099|0.098|3.2e-04|8.6e-01|4.0e+08| 2.892782e+08 -6.747233e+07| 0:0:01| lu 26↙
8
28|0.105|0.131|2.5e-04|7.4e-01|3.9e+08| 2.716465e+08 -4.983402e+07| 0:0:01| lu 30↙
6
29|0.319|0.465|1.7e-04|4.0e-01|3.3e+08| 2.368440e+08 -4.405119e+07| 0:0:01| lu 30↙
18
30|0.615|0.624|4.5e-05|1.5e-01|1.8e+08| 1.256041e+08 -2.798048e+07| 0:0:01| lu 30 ^↙
5
31|0.113|0.083|4.7e-05|1.4e-01|1.7e+08| 1.186926e+08 -2.776853e+07| 0:0:01| lu 30↙
```

```
^17
32|0.000|0.001|6.9e-05|1.4e-01|1.7e+08| 1.187485e+08 -2.793756e+07| 0:0:01| lu 30↙
30
33|0.000|0.001|9.1e-05|1.4e-01|1.7e+08| 1.187725e+08 -2.790970e+07| 0:0:01| lu 30 ^↙
5
34|0.000|0.001|1.1e-04|1.4e-01|1.7e+08| 1.188149e+08 -2.792770e+07| 0:0:01| lu 30↙
30
35|0.001|0.002|1.2e-04|1.4e-01|1.7e+08| 1.188711e+08 -2.782309e+07| 0:0:01| lu 26 ^↙
5
36|0.002|0.004|1.5e-04|1.4e-01|1.7e+08| 1.186787e+08 -2.787667e+07| 0:0:01| lu 21 ^↙
9
37|0.004|0.016|1.5e-04|1.3e-01|1.7e+08| 1.186538e+08 -2.750357e+07| 0:0:01| lu 28 ^↙
4
38|0.000|0.000|1.7e-04|1.3e-01|1.7e+08| 1.186429e+08 -2.744882e+07| 0:0:01| lu 24↙
^19
39|0.003|0.007|2.3e-04|1.3e-01|1.7e+08| 1.185271e+08 -2.751275e+07| 0:0:01| lu 29↙
^13
40|0.019|0.056|3.8e-04|1.3e-01|1.7e+08| 1.180489e+08 -2.767450e+07| 0:0:01| lu 20↙
^11
41|0.000|0.001|3.8e-04|1.3e-01|1.7e+08| 1.180416e+08 -2.765735e+07| 0:0:01| lu 30↙
30
42|0.000|0.000|3.8e-04|1.3e-01|1.7e+08| 1.180327e+08 -2.689134e+07| 0:0:01| lu 17 ^↙
5
43|0.034|0.110|3.5e-04|1.1e-01|1.6e+08| 1.170301e+08 -2.716708e+07| 0:0:01| lu 20↙
^27
44|0.002|0.006|3.7e-04|1.1e-01|1.6e+08| 1.171597e+08 -2.570698e+07| 0:0:01| lu 30↙
^15
45|0.022|0.041|3.2e-04|1.1e-01|1.6e+08| 1.163591e+08 -2.614748e+07| 0:0:01| lu 20↙
^18
46|0.004|0.006|3.2e-04|1.1e-01|1.6e+08| 1.165250e+08 -2.491579e+07| 0:0:01| lu 21↙
^10
47|0.005|0.030|3.0e-04|1.0e-01|1.6e+08| 1.163483e+08 -2.684177e+07| 0:0:01| lu 30↙
^27
48|0.000|0.000|4.3e-04|1.0e-01|1.6e+08| 1.162844e+08 -2.650495e+07| 0:0:01| lu 30↙
30
49|0.019|0.025|5.9e-04|1.0e-01|1.6e+08| 1.158561e+08 -2.656016e+07| 0:0:01| lu 12↙
30
50|0.009|0.032|5.6e-04|9.7e-02|1.6e+08| 1.157607e+08 -2.703396e+07| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  3.05652976e+08
 dual   objective value = -5.33191245e+07
 gap := trace(XZ)       = 4.18e+08
 relative gap           = 1.16e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 1.43e-04
 rel. dual   infeas     = 1.17e+00
 norm(X), norm(y), norm(Z) = 1.1e+08, 5.3e+07, 7.6e+07
 norm(A), norm(b), norm(C) = 1.3e+07, 2.2e+06, 7.7e+01
 Total CPU time (secs)  = 1.06
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 2.4e-04  0.0e+00  1.7e+00  0.0e+00  1.0e+00  1.2e+00
```

```
-----------------------------------------------------------------

ans =

   2.4362e+09

Iteration   5   Total error is: 2.2573

 num. of constraints = 61
 dim. of socp   var  = 62,   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|2.7e+02|7.2e+08| 4.608503e+06  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.972|7.3e-07|7.8e+00|2.9e+07| 4.493228e+06 -4.370779e+03| 0:0:00| chol  2↙
2
 2|0.776|0.699|2.8e-07|2.4e+00|1.4e+07| 4.762343e+06 -1.193664e+04| 0:0:00| chol  1↙
1
 3|0.445|0.473|1.5e-07|1.2e+00|1.0e+07| 4.791021e+06 -2.231177e+04| 0:0:00| chol  1↙
2
 4|0.244|0.456|1.2e-07|6.8e-01|8.1e+06| 4.742817e+06 -3.738618e+04| 0:0:00| chol  2↙
2
 5|0.248|0.405|8.9e-08|4.1e-01|6.7e+06| 4.578905e+06 -5.451676e+04| 0:0:00| chol  2↙
1
 6|0.187|0.467|7.2e-08|2.2e-01|5.6e+06| 4.383350e+06 -7.681079e+04| 0:0:00| chol  2↙
2
 7|0.277|0.374|5.2e-08|1.4e-01|4.9e+06| 4.026080e+06 -9.747039e+04| 0:0:00| chol  2↙
2
 8|0.161|0.563|5.2e-08|6.0e-02|4.3e+06| 3.805925e+06 -1.212485e+05| 0:0:00| chol  2↙
2
 9|0.402|0.283|3.7e-08|4.3e-02|3.7e+06| 3.256182e+06 -1.367298e+05| 0:0:00| chol  2↙
2
10|0.140|0.829|4.1e-08|7.4e-03|3.3e+06| 3.111726e+06 -1.403559e+05| 0:0:00| chol  2↙
2
11|0.367|0.351|3.4e-08|4.8e-03|3.0e+06| 2.766649e+06 -1.516463e+05| 0:0:00| chol  2↙
3
12|0.222|0.667|1.5e-07|1.6e-03|2.8e+06| 2.647616e+06 -1.169535e+05| 0:0:00| chol  2↙
2
13|0.554|0.740|6.5e-07|4.4e-04|2.3e+06| 2.082947e+06 -2.128904e+05| 0:0:00| chol  2↙
2
14|0.585|0.655|5.0e-07|1.6e-04|2.0e+06| 1.982896e+06 -5.839021e+04| 0:0:00| chol  2↙
2
15|0.883|1.000|1.5e-07|1.1e-05|8.0e+05| 6.889273e+05 -1.117635e+05| 0:0:00| chol  2↙
2
16|1.000|1.000|1.9e-08|5.7e-06|1.9e+05| 1.520474e+05 -3.727634e+04| 0:0:00| chol  2↙
2
17|1.000|1.000|2.0e-09|2.8e-06|7.2e+04| 6.138943e+04 -1.030938e+04| 0:0:00| chol  2↙
2
```

```
18|1.000|1.000|1.2e-09|1.4e-06|3.0e+04| 2.309595e+04 -6.823452e+03| 0:0:00| chol  2↙
2
19|1.000|1.000|3.0e-10|7.0e-07|1.2e+04| 1.006054e+04 -2.179713e+03| 0:0:00| chol  1↙
1
20|1.000|1.000|3.7e-09|7.1e-08|4.2e+03| 3.168896e+03 -1.055873e+03| 0:0:00| chol  1↙
1
21|1.000|1.000|1.4e-09|7.1e-09|1.8e+03| 1.404981e+03 -3.782255e+02| 0:0:00| chol  2↙
1
22|1.000|1.000|1.1e-09|8.4e-10|6.2e+02| 4.232390e+02 -1.960764e+02| 0:0:00| chol  1↙
1
23|1.000|1.000|4.8e-10|2.7e-10|2.5e+02| 1.561065e+02 -9.012327e+01| 0:0:00| chol  1↙
1
24|1.000|1.000|2.2e-10|1.0e-10|7.6e+01| 1.478988e+01 -6.168279e+01| 0:0:00| chol  1↙
1
25|1.000|1.000|1.2e-10|4.5e-11|3.1e+01|-1.753587e+01 -4.898282e+01| 0:0:00| chol  1↙
1
26|1.000|1.000|1.2e-10|2.4e-11|8.4e+00|-3.689417e+01 -4.530676e+01| 0:0:00| chol  1↙
1
27|1.000|1.000|3.0e-11|2.4e-11|3.8e+00|-4.037124e+01 -4.412360e+01| 0:0:00| chol  2↙
1
28|0.969|1.000|2.0e-11|5.9e-12|8.5e-01|-4.283806e+01 -4.369059e+01| 0:0:00| chol  1↙
1
29|1.000|1.000|1.7e-11|4.0e-12|3.8e-01|-4.322950e+01 -4.360639e+01| 0:0:00| chol  1↙
1
30|0.963|0.992|4.8e-12|3.4e-12|7.7e-02|-4.348962e+01 -4.356705e+01| 0:0:00| chol  2↙
2
31|0.882|1.000|1.6e-12|1.0e-12|3.7e-02|-4.352508e+01 -4.356177e+01| 0:0:00| chol  1↙
2
32|1.000|1.000|1.8e-12|1.0e-12|1.0e-02|-4.354968e+01 -4.355978e+01| 0:0:00| chol  2↙
2
33|0.934|1.000|5.7e-12|1.0e-12|3.5e-03|-4.355576e+01 -4.355929e+01| 0:0:00| chol  2↙
2
34|0.994|0.991|6.9e-12|1.1e-12|7.1e-04|-4.355847e+01 -4.355917e+01| 0:0:00| chol  3↙
4
35|1.000|1.000|1.5e-11|1.4e-12|2.3e-04|-4.355892e+01 -4.355915e+01| 0:0:00| chol  3↙
5
36|0.995|1.000|4.5e-11|2.1e-12|3.9e-05|-4.355911e+01 -4.355915e+01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   1
37|1.000|1.000|3.5e-11|3.1e-12|9.3e-06|-4.355914e+01 -4.355915e+01| 0:0:00| lu 30↙
1
38|1.000|1.000|1.8e-10|4.7e-12|5.1e-07|-4.355915e+01 -4.355915e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 38
 primal objective value = -4.35591497e+01
 dual   objective value = -4.35591502e+01
 gap := trace(XZ)       = 5.10e-07
 relative gap           = 5.79e-09
 actual relative gap    = 6.30e-09
 rel. primal infeas     = 1.81e-10
 rel. dual   infeas     = 4.66e-12
 norm(X), norm(y), norm(Z) = 7.2e+01, 6.0e+01, 2.4e+01
 norm(A), norm(b), norm(C) = 4.4e+04, 1.4e+04, 7.7e+01
```

```
 Total CPU time (secs)  = 0.25
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 4.0e-10  0.0e+00  6.7e-12  0.0e+00  6.3e-09  5.8e-09
------------------------------------------------------------------

ans =

   43.5592

Iteration   6   Total error is: 0.029206

 num. of constraints = 61
 dim. of socp   var  = 62,   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|4.9e+03|7.9e+09| 5.028442e+07  0.000000e+00| 0:0:00| chol  1↙
2
 1|1.000|0.957|1.6e-06|2.1e+02|4.2e+08| 4.898580e+07 -8.419134e+04| 0:0:00| chol  3↙
3
 2|0.518|0.696|8.3e-07|6.3e+01|2.0e+08| 5.484724e+07 -2.451072e+05| 0:0:00| chol  3↙
3
 3|0.387|0.413|5.1e-07|3.7e+01|1.6e+08| 5.762702e+07 -4.268547e+05| 0:0:00| chol  3↙
3
 4|0.204|0.451|4.0e-07|2.0e+01|1.2e+08| 5.843782e+07 -7.173317e+05| 0:0:00| chol  3↙
3
 5|0.250|0.360|3.0e-07|1.3e+01|9.8e+07| 5.751933e+07 -1.029855e+06| 0:0:00| chol  3↙
4
 6|0.142|0.494|2.6e-07|6.6e+00|7.9e+07| 5.595748e+07 -1.511197e+06| 0:0:00| chol  3↙
4
 7|0.314|0.293|1.8e-07|4.7e+00|6.9e+07| 5.127983e+07 -1.913669e+06| 0:0:00| chol  4↙
4
 8|0.096|0.670|1.6e-07|1.5e+00|5.7e+07| 4.924853e+07 -2.317657e+06| 0:0:00| chol  3↙
3
 9|0.263|0.201|1.2e-07|1.2e+00|5.4e+07| 4.516684e+07 -2.727494e+06| 0:0:00| chol  4↙
4
10|0.077|0.381|3.6e-07|7.6e-01|4.9e+07| 4.273106e+07 -1.485640e+06| 0:0:00| chol  3↙
3
11|0.293|0.397|2.5e-07|4.6e-01|4.3e+07| 3.668163e+07 -2.510163e+06| 0:0:00| chol  4↙
3
12|0.208|0.190|2.3e-07|3.7e-01|4.0e+07| 3.384888e+07 -2.986534e+06| 0:0:00| chol  4↙
5
13|0.130|0.393|2.2e-07|2.3e-01|3.8e+07| 3.227143e+07 -2.904192e+06| 0:0:00| chol  5↙
4
14|0.162|0.166|1.7e-07|1.9e-01|3.6e+07| 2.995890e+07 -3.066415e+06| 0:0:00| chol  5↙
5
15|0.085|0.253|5.1e-07|1.4e-01|3.5e+07| 2.904459e+07 -2.825936e+06| 0:0:00| chol  5↙
5
```

```
16|0.175|0.143|3.2e-06|1.2e-01|3.4e+07| 2.744000e+07 -2.936909e+06| 0:0:00| chol  5↙
5
17|0.202|0.193|5.0e-06|9.8e-02|3.2e+07| 2.559755e+07 -3.311098e+06| 0:0:00| chol  5↙
5
18|0.119|0.231|6.1e-06|7.5e-02|3.1e+07| 2.447809e+07 -3.411625e+06| 0:0:00| chol  6↙
6
19|0.108|0.141|1.0e-05|6.5e-02|3.0e+07| 2.341413e+07 -3.471320e+06| 0:0:00| chol  9↙
8
20|0.069|0.080|4.8e-06|5.9e-02|2.9e+07| 2.293125e+07 -3.509586e+06| 0:0:00| chol 28↙
*24
21|0.054|0.081|7.2e-06|5.5e-02|2.9e+07| 2.262770e+07 -3.529022e+06| 0:0:00| chol 12↙
29
22|0.050|0.070|4.4e-05|5.1e-02|2.8e+07| 2.228904e+07 -3.569067e+06| 0:0:00| chol *
  warning: symqmr failed: 2.0
  switch to LU factor. lu 30   7
23|0.050|0.097|3.0e-05|4.6e-02|2.8e+07| 2.206212e+07 -3.402057e+06| 0:0:00| lu 10↙
3
24|0.115|0.086|9.4e-05|4.2e-02|2.7e+07| 2.083592e+07 -3.525518e+06| 0:0:00| lu  7↙
2
25|0.252|0.395|1.8e-04|2.5e-02|2.4e+07| 1.906127e+07 -2.708423e+06| 0:0:00| lu  5↙
2
26|0.639|0.305|2.8e-05|1.8e-02|1.8e+07| 1.342305e+07 -3.242014e+06| 0:0:00| lu  4↙
2
27|0.951|0.152|3.3e-05|1.5e-02|1.4e+07| 9.720201e+06 -2.974527e+06| 0:0:00| lu  4↙
2
28|0.734|1.000|4.5e-06|6.6e-06|9.2e+06| 6.852112e+06 -2.340931e+06| 0:0:00| lu  3↙
1
29|1.000|0.623|7.9e-06|3.4e-06|6.2e+06| 4.747627e+06 -1.497596e+06| 0:0:00| lu  3↙
1
30|0.998|1.000|3.7e-06|1.4e-06|1.9e+06| 1.380550e+06 -5.237937e+05| 0:0:00| lu  3↙
1
31|1.000|1.000|1.0e-07|7.3e-07|8.7e+05| 6.742899e+05 -1.935960e+05| 0:0:00| lu  3↙
1
32|1.000|1.000|1.1e-07|2.1e-08|2.6e+05| 1.900612e+05 -7.171441e+04| 0:0:00| lu  3↙
1
33|1.000|1.000|1.5e-08|2.2e-08|1.1e+05| 8.417628e+04 -2.447160e+04| 0:0:00| lu  3↙
1
34|1.000|1.000|5.2e-09|3.0e-09|3.3e+04| 2.389931e+04 -9.322340e+03| 0:0:00| lu  3↙
1
35|1.000|1.000|5.0e-09|1.0e-09|1.4e+04| 1.061291e+04 -3.106680e+03| 0:0:00| lu  3↙
1
36|1.000|1.000|3.3e-09|1.0e-09|4.2e+03| 2.967664e+03 -1.213030e+03| 0:0:00| lu  3↙
1
37|1.000|1.000|1.9e-09|6.5e-10|1.7e+03| 1.310136e+03 -4.248866e+02| 0:0:00| lu  3↙
1
38|1.000|1.000|1.1e-09|3.7e-10|5.2e+02| 3.339947e+02 -1.884528e+02| 0:0:00| lu  3↙
1
39|1.000|1.000|7.4e-10|2.3e-10|2.2e+02| 1.268368e+02 -9.169045e+01| 0:0:00| lu  3↙
1
40|1.000|1.000|2.2e-10|1.5e-10|6.4e+01| 1.109068e+00 -6.244860e+01| 0:0:00| lu  3↙
1
41|1.000|1.000|1.8e-10|4.3e-11|2.7e+01|-2.424314e+01 -5.125676e+01| 0:0:00| lu  3↙
1
42|1.000|1.000|1.4e-10|3.6e-11|7.4e+00|-4.033961e+01 -4.771359e+01| 0:0:00| lu  3↙
```

```
1
43|1.000|1.000|7.8e-11|2.9e-11|3.3e+00|-4.326546e+01 -4.654463e+01| 0:0:00| lu  3↙
1
44|0.996|1.000|4.5e-11|1.6e-11|8.4e-01|-4.529644e+01 -4.613461e+01| 0:0:00| lu  3↙
1
45|1.000|1.000|4.5e-11|9.0e-12|3.8e-01|-4.564604e+01 -4.602567e+01| 0:0:00| lu  3↙
1
46|0.974|1.000|1.6e-11|8.9e-12|8.5e-02|-4.589611e+01 -4.598149e+01| 0:0:00| lu  3↙
1
47|1.000|1.000|5.3e-11|3.1e-12|3.7e-02|-4.593658e+01 -4.597359e+01| 0:0:00| lu  3↙
1
48|0.959|0.876|4.1e-11|5.1e-12|6.7e-03|-4.596358e+01 -4.597029e+01| 0:0:00| lu  5↙
1
49|0.884|1.000|3.4e-10|7.0e-12|3.0e-03|-4.596681e+01 -4.596977e+01| 0:0:00| lu  9↙
1
50|0.948|0.943|7.0e-10|1.1e-11|5.4e-04|-4.596906e+01 -4.596960e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -4.59690603e+01
 dual   objective value = -4.59695990e+01
 gap := trace(XZ)       = 5.38e-04
 relative gap           = 5.79e-06
 actual relative gap    = 5.80e-06
 rel. primal infeas     = 6.97e-10
 rel. dual   infeas     = 1.09e-11
 norm(X), norm(y), norm(Z) = 2.6e+03, 5.7e+01, 2.2e+01
 norm(A), norm(b), norm(C) = 1.1e+06, 1.1e+05, 7.7e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 1.1e-09  0.0e+00  1.6e-11  0.0e+00  5.8e-06  5.8e-06
-----------------------------------------------------------------

ans =

   45.9696

Iteration   7   Total error is: 0.02921

 num. of constraints = 61
 dim. of socp   var  = 62,   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|1.3e+05|3.0e+11| 1.938256e+09  0.000000e+00| 0:0:00| chol  2↙
2
 1|1.000|0.967|4.0e-07|4.1e+03|1.3e+10| 1.889009e+09 -2.338597e+06| 0:0:00| chol 26↙
25
```

```
 2|0.669|0.700|1.3e-07|1.2e+03|6.6e+09| 2.062010e+09 -6.415965e+06| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 13  11
 3|0.438|0.452|6.2e-08|6.8e+02|4.9e+09| 2.108293e+09 -1.133603e+07| 0:0:00| lu 30↙
^13
 4|0.223|0.449|2.9e-07|3.8e+02|3.8e+09| 2.106370e+09 -1.877115e+07| 0:0:00| lu 12↙
30
 5|0.228|0.406|6.4e-07|2.2e+02|3.1e+09| 2.055932e+09 -2.737904e+07| 0:0:00| lu 15↙
^27
 6|0.179|0.481|1.3e-06|1.2e+02|2.6e+09| 1.978770e+09 -3.802319e+07| 0:0:00| lu 30↙
^15
 7|0.008|0.015|1.9e-06|1.1e+02|2.6e+09| 1.974721e+09 -3.835691e+07| 0:0:00| lu 30↙
30
 8|0.024|0.083|5.7e-06|1.0e+02|2.5e+09| 1.957908e+09 -3.669503e+07| 0:0:00| lu 30↙
30
 9|0.009|0.026|6.6e-06|1.0e+02|2.5e+09| 1.950257e+09 -3.777576e+07| 0:0:00| lu 30↙
^20
10|0.004|0.016|5.1e-06|1.0e+02|2.5e+09| 1.952300e+09 -4.030981e+07| 0:0:00| lu 30↙
30
11|0.001|0.001|7.4e-06|1.0e+02|2.5e+09| 1.952102e+09 -4.081943e+07| 0:0:00| lu 29↙
^14
12|0.000|0.000|8.5e-06|1.0e+02|2.5e+09| 1.952227e+09 -4.222344e+07| 0:0:00| lu 30↙
^12
13|0.000|0.000|9.7e-06|1.0e+02|2.5e+09| 1.952286e+09 -4.251210e+07| 0:0:00| lu 14↙
30
14|0.000|0.001|7.4e-06|1.0e+02|2.5e+09| 1.951845e+09 -4.197590e+07| 0:0:00| lu 30↙
30
15|0.000|0.000|2.4e-05|1.0e+02|2.5e+09| 1.952997e+09 -4.343157e+07| 0:0:00| lu 14↙
30
16|0.002|0.004|2.3e-05|1.0e+02|2.5e+09| 1.950079e+09 -4.217361e+07| 0:0:00| lu 14↙
30
17|0.008|0.023|2.4e-05|9.7e+01|2.5e+09| 1.952300e+09 -4.549833e+07| 0:0:00| lu 14↙
30
18|0.000|0.000|2.3e-05|9.7e+01|2.5e+09| 1.952122e+09 -4.500405e+07| 0:0:00| lu 15↙
30
19|0.000|0.000|3.9e-05|9.7e+01|2.5e+09| 1.948554e+09 -3.922690e+07| 0:0:00| lu 30↙
^23
20|0.009|0.017|3.9e-05|9.6e+01|2.5e+09| 1.959710e+09 -4.414728e+07| 0:0:00| lu 30↙
^13
21|0.007|0.023|3.4e-05|9.4e+01|2.5e+09| 1.939849e+09 -4.222826e+07| 0:0:00| lu 30↙
^25
22|0.011|0.043|3.2e-05|9.0e+01|2.4e+09| 1.949090e+09 -4.925291e+07| 0:0:00| lu 22↙
^11
23|0.004|0.006|3.5e-05|8.9e+01|2.4e+09| 1.943531e+09 -5.595417e+07| 0:0:00| lu 30 ^↙
5
24|0.071|0.141|3.6e-05|7.7e+01|2.4e+09| 1.921103e+09 -5.961147e+07| 0:0:01| lu 30↙
14
25|0.119|0.103|3.0e-05|6.9e+01|2.3e+09| 1.905595e+09 -5.634981e+07| 0:0:01| lu 30 ^↙
7
26|0.025|0.124|2.5e-05|6.0e+01|2.3e+09| 1.851358e+09 -7.021457e+07| 0:0:01| lu 30↙
5
27|0.411|0.461|1.4e-05|3.2e+01|2.0e+09| 1.715531e+09 -7.002984e+07| 0:0:01| lu 23↙
^11
28|0.396|0.480|7.2e-06|1.7e+01|1.5e+09| 1.296788e+09 -6.357438e+07| 0:0:01| lu 17↙
```

```
30
29|0.060|0.199|6.2e-05|1.4e+01|1.5e+09| 1.249100e+09 -7.394965e+07| 0:0:01| lu 30↙
^14
30|0.184|0.166|4.5e-05|1.1e+01|1.4e+09| 1.245142e+09 -8.419890e+07| 0:0:01| lu 20↙
30
31|0.066|0.374|4.0e-05|7.1e+00|1.3e+09| 1.186769e+09 -7.175364e+07| 0:0:01| lu 23↙
^18
32|0.196|0.338|4.8e-05|4.7e+00|1.3e+09| 1.095885e+09 -8.298028e+07| 0:0:01| lu 26↙
^20
33|0.083|0.093|6.8e-05|4.2e+00|1.2e+09| 1.060785e+09 -8.043106e+07| 0:0:01| lu 13↙
30
34|0.026|0.044|1.2e-04|4.1e+00|1.2e+09| 1.067516e+09 -9.487917e+07| 0:0:01| lu 30↙
^25
35|0.015|0.031|8.9e-05|3.9e+00|1.2e+09| 1.037887e+09 -8.637304e+07| 0:0:01| lu 30↙
^10
36|0.022|0.090|8.8e-05|3.6e+00|1.2e+09| 1.047634e+09 -1.201529e+08| 0:0:01| lu 12↙
^23
37|0.113|0.291|9.2e-05|2.5e+00|1.2e+09| 9.705274e+08 -1.191890e+08| 0:0:01| lu 30↙
16
38|0.243|0.152|5.9e-04|2.1e+00|1.2e+09| 9.580759e+08 -9.535547e+07| 0:0:01| lu 27 ^↙
8
39|0.157|0.153|4.3e-04|1.8e+00|1.1e+09| 7.656322e+08 -1.003229e+08| 0:0:01| lu 13↙
^18
40|0.128|0.126|1.8e-04|1.6e+00|1.1e+09| 7.607566e+08 -2.457897e+08| 0:0:01| lu 12↙
^19
41|0.097|0.090|2.4e-04|1.4e+00|9.9e+08| 7.341427e+08 -3.987795e+08| 0:0:01| lu 30 ^↙
7
42|0.041|0.051|2.4e-04|1.4e+00|9.3e+08| 7.332380e+08 -6.704111e+08| 0:0:01| lu 21↙
30
43|0.057|0.091|1.4e-03|1.2e+00|9.2e+08| 7.131260e+08 -3.119767e+08| 0:0:01| lu * 6↙
30
44|0.005|0.004|1.4e-03|1.2e+00|9.4e+08| 7.087362e+08 -3.564391e+08| 0:0:01| lu 11↙
^22
45|0.007|0.014|1.4e-03|1.2e+00|9.5e+08| 7.047041e+08 -3.952994e+08| 0:0:01| lu 13 ^↙
4
46|0.045|0.201|1.4e-03|9.8e-01|1.1e+09| 7.014484e+08 -6.013569e+08| 0:0:01| lu 25↙
11
47|0.497|0.553|7.4e-04|4.4e-01|8.8e+08| 5.518860e+08 -2.217881e+08| 0:0:01| lu 30↙
14
48|0.489|0.468|2.5e-04|2.3e-01|6.4e+08| 4.173305e+08 -2.128834e+08| 0:0:01| lu 26↙
^17
49|0.557|0.621|1.1e-03|8.8e-02|4.7e+08| 2.965942e+08 -1.003892e+08| 0:0:01| lu 23↙
9
50|1.000|1.000|9.9e-05|7.5e-05|1.3e+08| 9.657054e+07 -3.594175e+07| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  7.01448396e+08
 dual   objective value = -6.01356947e+08
 gap := trace(XZ)       = 1.14e+09
 relative gap           = 8.77e-01
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 1.35e-03
 rel. dual   infeas     = 9.80e-01
```

```
 norm(X), norm(y), norm(Z) = 3.4e+08, 6.0e+08, 8.5e+08
 norm(A), norm(b), norm(C) = 2.3e+07, 4.3e+06, 7.7e+01
 Total CPU time (secs)  = 1.06
 CPU time per iteration = 0.02
 termination code       = -6
 DIMACS errors: 2.2e-03  0.0e+00  1.4e+00  0.0e+00  1.0e+00  8.8e-01
------------------------------------------------------------------

ans =

   2.2152e+10

Iteration   8   Total error is: 4.3967
The total representation error of the testing signals is: 0.0081755
>>
```