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

 num. of constraints = 25
 dim. of socp   var  = 26,   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|1.5e+00|1.0e+01|1.3e+06| 2.236957e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.900|3.8e-05|1.1e+00|1.5e+05| 2.133338e+04 -7.084648e+01| 0:0:00| chol  1↙
1
 2|0.313|0.941|2.6e-05|9.8e-02|3.7e+04| 2.378662e+04 -1.806927e+02| 0:0:00| chol  1↙
1
 3|1.000|0.998|5.4e-06|1.0e-02|1.9e+04| 1.736263e+04 -1.953315e+02| 0:0:00| chol  1↙
1
 4|0.963|1.000|2.0e-06|3.0e-03|7.3e+02| 5.361097e+02 -1.858189e+02| 0:0:00| chol  1↙
1
 5|1.000|0.236|5.2e-06|2.4e-03|7.5e+02| 5.896199e+02 -1.520956e+02| 0:0:00| chol  1↙
1
 6|0.400|1.000|3.1e-06|3.1e-05|6.4e+02| 4.930318e+02 -1.505726e+02| 0:0:00| chol  1↙
1
 7|1.000|0.749|1.5e-08|1.1e-05|3.9e+02| 2.894007e+02 -9.971509e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|4.3e-09|3.0e-07|2.4e+02| 1.510341e+02 -8.582352e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|4.5e-10|3.1e-08|9.8e+01| 3.177757e+01 -6.581085e+01| 0:0:00| chol  1↙
1
10|1.000|1.000|1.3e-12|3.1e-09|5.2e+01|-1.074338e+01 -6.291249e+01| 0:0:00| chol  1↙
1
11|1.000|1.000|4.4e-14|3.0e-10|2.1e+01|-3.440008e+01 -5.533472e+01| 0:0:00| chol  1↙
1
12|1.000|1.000|1.4e-13|3.1e-11|8.2e+00|-4.544344e+01 -5.363835e+01| 0:0:01| chol  1↙
1
13|1.000|1.000|1.9e-14|4.0e-12|3.3e+00|-4.896564e+01 -5.224321e+01| 0:0:01| chol  1↙
1
14|1.000|1.000|1.6e-14|1.3e-12|1.1e+00|-5.073522e+01 -5.185690e+01| 0:0:01| chol  1↙
1
15|1.000|1.000|1.3e-14|1.0e-12|4.5e-01|-5.120733e+01 -5.166092e+01| 0:0:01| chol  1↙
1
16|1.000|1.000|8.2e-15|1.0e-12|1.4e-01|-5.145776e+01 -5.159925e+01| 0:0:01| chol  1↙
1
17|1.000|1.000|2.9e-15|1.0e-12|5.9e-02|-5.151620e+01 -5.157486e+01| 0:0:01| chol  1↙
1
18|1.000|1.000|7.0e-15|1.0e-12|1.6e-02|-5.154982e+01 -5.156625e+01| 0:0:01| chol  1↙
1
19|1.000|1.000|5.2e-15|1.0e-12|6.8e-03|-5.155676e+01 -5.156354e+01| 0:0:01| chol  1↙
1
```

```
20|0.995|1.000|1.3e-14|1.0e-12|1.4e-03|-5.156104e+01 -5.156246e+01| 0:0:01| chol  1↙
1
21|0.976|1.000|1.1e-12|1.0e-12|6.2e-04|-5.156171e+01 -5.156233e+01| 0:0:01| chol  1↙
1
22|1.000|1.000|1.3e-13|1.0e-12|1.5e-04|-5.156211e+01 -5.156225e+01| 0:0:01| chol  1↙
1
23|0.714|0.980|2.7e-12|1.0e-12|6.5e-05|-5.156218e+01 -5.156225e+01| 0:0:01| chol  1↙
1
24|0.948|0.989|2.1e-12|1.0e-12|1.3e-05|-5.156223e+01 -5.156225e+01| 0:0:01| chol  2↙
2
25|0.833|1.000|5.8e-13|1.0e-12|5.6e-06|-5.156224e+01 -5.156224e+01| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 25
 primal objective value = -5.15622394e+01
 dual   objective value = -5.15622449e+01
 gap := trace(XZ)       = 5.57e-06
 relative gap           = 5.35e-08
 actual relative gap    = 5.35e-08
 rel. primal infeas     = 5.76e-13
 rel. dual   infeas     = 1.00e-12
 norm(X), norm(y), norm(Z) = 8.6e-01, 5.2e+01, 2.0e+01
 norm(A), norm(b), norm(C) = 1.5e+02, 2.9e+00, 7.7e+01
 Total CPU time (secs)  = 0.60
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 8.2e-13  0.0e+00  1.4e-12  0.0e+00  5.3e-08  5.3e-08
-----------------------------------------------------------------

ans =

   51.5622


 num. of constraints = 25
 dim. of socp   var  = 26,   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|1.6e+04|1.2e+11| 2.063672e+09  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.916|0.862|8.4e-02|2.2e+03|1.9e+10| 1.954554e+09  5.215605e+05| 0:0:00| chol  1↙
1
 2|1.000|0.784|3.3e-11|4.7e+02|8.9e+09| 2.736687e+09 -3.642137e+06| 0:0:00| chol  1↙
1
 3|0.487|0.613|3.5e-11|1.8e+02|5.3e+09| 2.637304e+09 -8.101477e+06| 0:0:00| chol  1↙
2
 4|0.369|0.440|3.7e-11|1.0e+02|4.2e+09| 2.561645e+09 -1.341095e+07| 0:0:00| chol  2↙
2
```

```
 5|0.220|0.468|5.3e-11|5.4e+01|3.4e+09| 2.488924e+09 -2.091956e+07| 0:0:00| chol  2↙
2
 6|0.276|0.395|1.3e-10|3.3e+01|3.0e+09| 2.349965e+09 -2.837240e+07| 0:0:00| chol  2↙
2
 7|0.190|0.541|7.0e-10|1.5e+01|2.6e+09| 2.231507e+09 -3.628466e+07| 0:0:00| chol  2↙
2
 8|0.372|0.299|1.6e-09|1.1e+01|2.2e+09| 1.984183e+09 -4.205966e+07| 0:0:00| chol  2↙
2
 9|0.158|0.746|5.7e-09|2.7e+00|2.0e+09| 1.883361e+09 -3.374954e+07| 0:0:00| chol  2↙
2
10|0.196|0.151|1.5e-08|2.3e+00|1.9e+09| 1.776931e+09 -3.935309e+07| 0:0:00| chol  2↙
2
11|0.180|0.124|4.5e-09|2.0e+00|1.8e+09| 1.667873e+09 -3.951502e+07| 0:0:00| chol  2↙
* 3
12|0.005|0.069|1.4e-09|1.8e+00|1.8e+09| 1.671801e+09 -3.909584e+07| 0:0:00| chol  2↙
2
13|0.097|0.558|6.3e-10|8.2e-01|1.7e+09| 1.611419e+09 -2.738692e+07| 0:0:00| chol  2↙
2
14|0.107|0.188|1.3e-07|6.6e-01|1.6e+09| 1.549608e+09 -3.273707e+07| 0:0:00| chol  2↙
2
15|0.055|0.305|5.7e-07|4.6e-01|1.6e+09| 1.523387e+09 -3.835919e+07| 0:0:00| chol  2↙
2
16|0.099|0.476|5.4e-07|2.4e-01|1.6e+09| 1.488599e+09 -4.061393e+07| 0:0:00| chol  2↙
2
17|0.184|0.119|1.2e-06|2.1e-01|1.5e+09| 1.412452e+09 -4.597825e+07| 0:0:00| chol  2↙
2
18|0.087|0.303|1.7e-07|1.5e-01|1.5e+09| 1.400289e+09 -4.520188e+07| 0:0:00| chol  2↙
2
19|0.067|0.707|1.8e-06|4.3e-02|1.4e+09| 1.362130e+09 -3.319552e+07| 0:0:00| chol  2↙
2
20|0.175|0.306|2.7e-07|3.0e-02|1.3e+09| 1.255249e+09 -4.625405e+07| 0:0:00| chol  2↙
2
21|0.179|0.183|2.0e-05|2.5e-02|1.3e+09| 1.213516e+09 -5.152696e+07| 0:0:00| chol  2↙
2
22|0.241|0.167|3.3e-04|2.1e-02|1.3e+09| 1.171030e+09 -4.684739e+07| 0:0:00| chol  2↙
2
23|0.179|0.257|1.0e-03|1.5e-02|1.2e+09| 1.126169e+09 -7.434223e+07| 0:0:00| chol  2↙
2
24|0.514|1.000|6.1e-04|7.3e-09|9.8e+08| 9.337029e+08 -5.108971e+07| 0:0:00| chol  2↙
2
25|1.000|1.000|1.2e-04|1.1e-08|6.8e+08| 6.027288e+08 -7.979773e+07| 0:0:00| chol  2↙
2
26|1.000|1.000|1.4e-04|1.6e-08|3.9e+08| 3.501695e+08 -3.825044e+07| 0:0:00| chol  2↙
2
27|1.000|1.000|1.4e-06|2.4e-08|1.3e+08| 1.078980e+08 -2.177107e+07| 0:0:00| chol  2↙
2
28|1.000|1.000|2.9e-06|3.7e-08|5.8e+07| 4.995598e+07 -7.833426e+06| 0:0:00| chol  2↙
2
29|1.000|1.000|6.9e-07|5.5e-08|2.2e+07| 1.783474e+07 -4.142127e+06| 0:0:00| chol  2↙
2
30|1.000|1.000|4.3e-07|8.3e-08|9.2e+06| 7.616243e+06 -1.562463e+06| 0:0:00| chol  1↙
2
31|1.000|1.000|2.4e-07|8.7e-08|3.3e+06| 2.559677e+06 -7.304755e+05| 0:0:00| chol  1↙
2
```

```
32|1.000|1.000|6.1e-08|4.8e-08|1.4e+06| 1.100600e+06 -2.692099e+05| 0:0:00| chol  1↙
2
33|1.000|1.000|1.9e-09|1.2e-08|5.1e+05| 3.837513e+05 -1.237614e+05| 0:0:00| chol  1↙
2
34|1.000|1.000|8.0e-10|3.8e-10|2.0e+05| 1.605366e+05 -4.404120e+04| 0:0:00| chol  1↙
2
35|1.000|1.000|7.1e-10|1.6e-10|6.9e+04| 5.130338e+04 -1.792001e+04| 0:0:00| chol  1↙
2
36|1.000|1.000|6.3e-11|1.4e-10|2.8e+04| 2.175469e+04 -6.315101e+03| 0:0:00| chol  1↙
2
37|1.000|1.000|5.5e-11|1.3e-11|8.9e+03| 6.506657e+03 -2.359901e+03| 0:0:00| chol  1↙
1
38|1.000|1.000|4.7e-12|1.1e-11|3.7e+03| 2.837332e+03 -8.553739e+02| 0:0:00| chol  1↙
1
39|1.000|1.000|5.4e-13|1.0e-12|1.1e+03| 7.959890e+02 -3.262087e+02| 0:0:00| chol  1↙
1
40|1.000|1.000|4.7e-12|1.0e-12|4.8e+02| 3.372995e+02 -1.390932e+02| 0:0:00| chol  1↙
1
41|1.000|1.000|7.7e-13|1.0e-12|1.4e+02| 6.620883e+01 -7.247801e+01| 0:0:00| chol  1↙
1
42|1.000|1.000|2.7e-12|1.0e-12|6.0e+01| 9.348410e+00 -5.065527e+01| 0:0:00| chol  1↙
1
43|1.000|1.000|1.1e-12|1.0e-12|1.6e+01|-2.647608e+01 -4.276490e+01| 0:0:00| chol  1↙
1
44|1.000|1.000|3.2e-13|1.0e-12|7.3e+00|-3.323027e+01 -4.051140e+01| 0:0:00| chol  1↙
1
45|0.994|1.000|2.8e-13|1.0e-12|1.7e+00|-3.788972e+01 -3.963492e+01| 0:0:00| chol  1↙
1
46|1.000|1.000|5.8e-14|1.0e-12|8.2e-01|-3.862160e+01 -3.944419e+01| 0:0:00| chol  1↙
1
47|0.975|1.000|6.0e-13|1.0e-12|1.7e-01|-3.917970e+01 -3.935443e+01| 0:0:00| chol  1↙
1
48|1.000|1.000|7.3e-13|1.0e-12|7.7e-02|-3.926268e+01 -3.933998e+01| 0:0:00| chol  1↙
1
49|0.969|0.948|1.9e-12|1.1e-12|1.4e-02|-3.931846e+01 -3.933244e+01| 0:0:00| chol  2↙
2
50|1.000|1.000|5.4e-13|1.0e-12|5.6e-03|-3.932579e+01 -3.933140e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -3.93257916e+01
 dual   objective value = -3.93313974e+01
 gap := trace(XZ)       = 5.61e-03
 relative gap           = 7.04e-05
 actual relative gap    = 7.04e-05
 rel. primal infeas     = 5.40e-13
 rel. dual   infeas     = 1.00e-12
 norm(X), norm(y), norm(Z) = 3.0e+02, 6.4e+01, 2.7e+01
 norm(A), norm(b), norm(C) = 2.6e+06, 4.2e+06, 7.7e+01
 Total CPU time (secs)  = 0.37
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 8.1e-13  0.0e+00  1.4e-12  0.0e+00  7.0e-05  7.0e-05
-----------------------------------------------------------------
```

```
ans =

   39.3313

Iteration   2   Total error is: 0.029084

 num. of constraints = 25
 dim. of socp   var  = 26,   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|1.1e+05|1.7e+11| 3.032448e+09  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.990|0.892|1.0e-02|1.2e+04|2.2e+10| 2.824364e+09 -8.869031e+05| 0:0:00| chol  1↙
1
 2|0.934|0.632|6.8e-04|4.5e+03|1.5e+10| 3.757895e+09 -1.297639e+07| 0:0:00| chol  1↙
1
 3|0.496|0.491|3.4e-04|2.3e+03|1.1e+10| 4.097950e+09 -2.552626e+07| 0:0:00| chol  2↙
2
 4|0.295|0.455|2.4e-04|1.3e+03|8.2e+09| 4.208173e+09 -4.112371e+07| 0:0:00| chol  2↙
2
 5|0.260|0.442|1.8e-04|7.0e+02|6.6e+09| 4.162839e+09 -5.857365e+07| 0:0:00| chol  2↙
2
 6|0.250|0.469|1.3e-04|3.7e+02|5.4e+09| 3.988546e+09 -7.570044e+07| 0:0:00| chol  2↙
2
 7|0.289|0.412|9.6e-05|2.2e+02|4.6e+09| 3.682161e+09 -8.885923e+07| 0:0:00| chol  2↙
2
 8|0.225|0.471|7.4e-05|1.2e+02|4.0e+09| 3.417424e+09 -9.436332e+07| 0:0:00| chol  2↙
2
 9|0.263|0.277|5.5e-05|8.4e+01|3.6e+09| 3.113110e+09 -1.047645e+08| 0:0:00| chol  2↙
2
10|0.115|0.589|4.8e-05|3.4e+01|3.3e+09| 3.011463e+09 -8.919295e+07| 0:0:00| chol  2↙
2
11|0.136|0.222|4.2e-05|2.7e+01|3.2e+09| 2.899590e+09 -1.071286e+08| 0:0:00| chol  2↙
2
12|0.062|0.668|3.9e-05|8.9e+00|3.0e+09| 2.814972e+09 -7.489977e+07| 0:0:00| chol  2↙
2
13|0.117|0.197|3.5e-05|7.1e+00|2.9e+09| 2.707962e+09 -1.033050e+08| 0:0:00| chol  2↙
2
14|0.091|0.299|3.2e-05|5.0e+00|2.9e+09| 2.626166e+09 -1.177042e+08| 0:0:00| chol  2↙
2
15|0.089|0.163|2.7e-05|4.2e+00|2.8e+09| 2.540062e+09 -7.476341e+07| 0:0:00| chol  2↙
2
16|0.207|0.267|2.0e-05|3.1e+00|2.7e+09| 2.441631e+09 -1.396260e+08| 0:0:00| chol  2↙
2
17|0.158|0.667|1.7e-05|1.0e+00|2.4e+09| 2.239868e+09 -1.109614e+08| 0:0:00| chol  2↙
2
18|0.121|0.209|1.6e-05|8.1e-01|2.3e+09| 2.102007e+09 -1.269198e+08| 0:0:00| chol  2↙
```

```
2
19|0.065|0.375|1.5e-05|5.1e-01|2.3e+09| 2.053638e+09 -1.098471e+08| 0:0:00| chol  2↙
2
20|0.086|0.082|6.3e-06|4.6e-01|2.2e+09| 1.982267e+09 -1.175542e+08| 0:0:00| chol  2↙
2
21|0.074|0.062|3.8e-05|4.4e-01|2.2e+09| 1.951480e+09 -1.148167e+08| 0:0:00| chol  2↙
2
22|0.008|0.076|3.8e-05|4.0e-01|2.2e+09| 1.936041e+09 -1.374998e+08| 0:0:00| chol  2↙
2
23|0.068|0.211|3.9e-05|3.2e-01|2.2e+09| 1.880901e+09 -1.419741e+08| 0:0:00| chol  2↙
2
24|0.058|0.141|2.4e-05|2.7e-01|2.1e+09| 1.844837e+09 -1.439364e+08| 0:0:00| chol  2↙
2
25|0.064|0.150|2.3e-05|2.3e-01|2.1e+09| 1.811683e+09 -1.442668e+08| 0:0:00| chol  2↙
2
26|0.051|0.068|4.8e-06|2.2e-01|2.1e+09| 1.779074e+09 -1.555633e+08| 0:0:00| chol  2↙
2
27|0.046|0.056|8.2e-04|2.0e-01|2.1e+09| 1.756105e+09 -1.616626e+08| 0:0:00| chol *
  warning: symqmr failed: 2.0
  switch to LU factor. lu * 3   1
28|0.039|0.049|2.9e-03|1.9e-01|2.1e+09| 1.736468e+09 -1.682153e+08| 0:0:00| lu * 3↙
1
29|0.036|0.066|3.1e-03|1.8e-01|2.0e+09| 1.720708e+09 -1.731522e+08| 0:0:00| lu  3↙
1
30|0.031|0.080|2.6e-03|1.7e-01|2.0e+09| 1.704695e+09 -1.774605e+08| 0:0:00| lu * 3↙
1
31|0.039|0.153|2.9e-03|1.4e-01|2.0e+09| 1.690457e+09 -1.524071e+08| 0:0:00| lu  2↙
1
32|0.013|0.114|2.8e-03|1.3e-01|2.0e+09| 1.678760e+09 -1.699640e+08| 0:0:00| lu  2↙
1
33|0.065|0.137|2.6e-03|1.1e-01|2.0e+09| 1.641938e+09 -1.732682e+08| 0:0:00| lu  2↙
1
34|0.082|0.248|2.1e-03|8.1e-02|1.9e+09| 1.609464e+09 -1.625889e+08| 0:0:00| lu  2↙
1
35|0.083|0.130|1.5e-03|7.1e-02|1.8e+09| 1.551047e+09 -1.694040e+08| 0:0:00| lu  2↙
1
36|0.081|0.124|2.3e-03|6.2e-02|1.8e+09| 1.517766e+09 -1.768245e+08| 0:0:00| lu  3↙
1
37|0.068|0.110|9.7e-04|5.5e-02|1.8e+09| 1.488172e+09 -1.851571e+08| 0:0:00| lu * 3↙
1
38|0.081|0.295|4.1e-03|3.9e-02|1.8e+09| 1.466602e+09 -1.694207e+08| 0:0:00| lu  2↙
1
39|0.097|0.245|3.0e-03|2.9e-02|1.7e+09| 1.421928e+09 -1.813766e+08| 0:0:00| lu  2↙
1
40|0.189|0.685|3.5e-03|9.3e-03|1.6e+09| 1.367839e+09 -1.299290e+08| 0:0:00| lu  2↙
1
41|0.282|0.489|2.3e-03|4.8e-03|1.5e+09| 1.253736e+09 -1.752991e+08| 0:0:00| lu  2↙
1
42|0.437|1.000|1.2e-03|4.2e-04|1.4e+09| 1.128233e+09 -1.747404e+08| 0:0:00| lu  2↙
1
43|1.000|1.000|2.2e-04|2.5e-04|1.0e+09| 7.983228e+08 -1.986347e+08| 0:0:00| lu  2↙
1
44|1.000|1.000|1.3e-03|4.4e-05|4.3e+08| 3.247471e+08 -1.042889e+08| 0:0:00| lu  2↙
1
```

```
45|1.000|1.000|8.3e-06|6.6e-05|1.9e+08| 1.436944e+08 -3.696013e+07| 0:0:00| lu  2↙
1
46|1.000|1.000|3.3e-05|1.7e-06|5.9e+07| 4.387581e+07 -1.534779e+07| 0:0:00| lu  2↙
1
47|1.000|1.000|3.7e-05|2.5e-06|2.7e+07| 2.127267e+07 -5.978219e+06| 0:0:00| lu  2↙
1
48|1.000|1.000|2.9e-06|3.7e-06|8.4e+06| 6.109378e+06 -2.242996e+06| 0:0:00| lu  2↙
1
49|1.000|1.000|2.3e-06|5.8e-07|3.6e+06| 2.780704e+06 -8.164320e+05| 0:0:00| lu  2↙
1
50|1.000|1.000|1.6e-07|4.7e-07|1.1e+06| 8.220809e+05 -3.072639e+05| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  2.23986802e+09
 dual   objective value = -1.10961380e+08
 gap := trace(XZ)       = 2.44e+09
 relative gap           = 1.04e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 1.69e-05
 rel. dual   infeas     = 1.02e+00
 norm(X), norm(y), norm(Z) = 7.6e+08, 1.1e+08, 1.6e+08
 norm(A), norm(b), norm(C) = 1.9e+07, 6.2e+06, 7.7e+01
 Total CPU time (secs)  = 0.41
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 2.6e-05  0.0e+00  1.5e+00  0.0e+00  1.0e+00  1.0e+00
-----------------------------------------------------------------

ans =

   4.2026e+09

Iteration   3   Total error is: 5.4047

 num. of constraints = 25
 dim. of socp   var  = 26,   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|6.9e+01|7.4e+07| 1.303355e+06  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.989|0.902|1.1e-02|6.8e+00|9.0e+06| 1.211868e+06 -6.089766e+02| 0:0:00| chol  1↙
1
 2|0.646|0.577|3.8e-03|2.9e+00|5.9e+06| 1.468392e+06 -6.270302e+03| 0:0:00| chol  1↙
1
 3|0.407|0.454|2.3e-03|1.6e+00|4.5e+06| 1.601229e+06 -1.213110e+04| 0:0:00| chol  1↙
1
 4|0.253|0.458|1.7e-03|8.6e-01|3.4e+06| 1.651391e+06 -1.983374e+04| 0:0:00| chol  1↙
```

```
1
 5|0.261|0.413|1.2e-03|5.1e-01|2.7e+06| 1.641296e+06 -2.831041e+04| 0:0:00| chol  1↙
1
 6|0.210|0.500|9.8e-04|2.5e-01|2.2e+06| 1.588118e+06 -3.759601e+04| 0:0:00| chol  1↙
1
 7|0.315|0.340|6.7e-04|1.7e-01|1.9e+06| 1.459710e+06 -4.541514e+04| 0:0:00| chol  1↙
1
 8|0.154|0.603|5.7e-04|6.7e-02|1.6e+06| 1.393304e+06 -5.019361e+04| 0:0:00| chol  1↙
1
 9|0.369|0.210|3.6e-04|5.3e-02|1.4e+06| 1.226314e+06 -5.595858e+04| 0:0:00| chol  1↙
1
10|0.103|0.843|3.2e-04|8.4e-03|1.3e+06| 1.181383e+06 -5.293088e+04| 0:0:00| chol  1↙
1
11|0.384|0.182|2.0e-04|6.9e-03|1.2e+06| 1.066868e+06 -5.857055e+04| 0:0:00| chol  1↙
2
12|0.186|1.000|1.6e-04|1.3e-04|1.1e+06| 1.031061e+06 -4.670442e+04| 0:0:00| chol  1↙
2
13|0.781|0.472|3.5e-05|1.2e-04|9.2e+05| 8.423694e+05 -7.622198e+04| 0:0:00| chol  1↙
1
14|0.441|1.000|2.0e-05|3.0e-05|8.4e+05| 7.768990e+05 -6.506806e+04| 0:0:00| chol  1↙
1
15|1.000|1.000|5.6e-09|1.5e-05|5.1e+05| 4.471771e+05 -5.831978e+04| 0:0:00| chol  1↙
1
16|1.000|1.000|6.5e-09|5.6e-06|2.1e+05| 1.852582e+05 -2.703960e+04| 0:0:00| chol  1↙
1
17|1.000|1.000|4.9e-09|2.8e-06|8.9e+04| 7.535726e+04 -1.372055e+04| 0:0:00| chol  1↙
1
18|1.000|1.000|1.4e-10|1.4e-06|3.6e+04| 3.015916e+04 -5.979981e+03| 0:0:00| chol  1↙
1
19|1.000|1.000|5.9e-11|7.0e-07|1.3e+04| 1.072421e+04 -2.635005e+03| 0:0:00| chol  1↙
1
20|1.000|1.000|4.4e-11|7.0e-08|5.4e+03| 4.333826e+03 -1.085130e+03| 0:0:00| chol  1↙
1
21|1.000|1.000|9.2e-11|7.1e-09|2.0e+03| 1.504547e+03 -4.664614e+02| 0:0:00| chol  1↙
1
22|1.000|1.000|1.7e-11|7.2e-10|8.0e+02| 5.978025e+02 -2.046365e+02| 0:0:00| chol  1↙
1
23|1.000|1.000|2.6e-11|7.4e-11|2.7e+02| 1.650567e+02 -1.007045e+02| 0:0:00| chol  1↙
1
24|1.000|1.000|1.6e-12|1.2e-11|1.1e+02| 4.450347e+01 -6.329602e+01| 0:0:00| chol  1↙
1
25|1.000|1.000|3.6e-12|1.7e-12|3.2e+01|-1.676009e+01 -4.873711e+01| 0:0:00| chol  1↙
1
26|1.000|1.000|2.1e-13|1.1e-12|1.3e+01|-3.112365e+01 -4.453065e+01| 0:0:00| chol  1↙
1
27|1.000|1.000|1.6e-12|1.0e-12|3.5e+00|-3.938570e+01 -4.288415e+01| 0:0:00| chol  1↙
1
28|1.000|1.000|7.9e-13|1.0e-12|1.5e+00|-4.098422e+01 -4.250642e+01| 0:0:00| chol  1↙
1
29|0.979|1.000|5.6e-13|1.0e-12|3.2e-01|-4.203052e+01 -4.234885e+01| 0:0:00| chol  1↙
1
30|1.000|1.000|5.2e-12|1.0e-12|1.4e-01|-4.218191e+01 -4.232625e+01| 0:0:00| chol  1↙
1
31|0.972|1.000|7.0e-12|1.0e-12|2.9e-02|-4.228582e+01 -4.231474e+01| 0:0:00| chol  2↙
```

```
2
32|1.000|1.000|1.1e-12|1.4e-12|1.3e-02|-4.230071e+01 -4.231325e+01| 0:0:00| chol  2↙
1
33|0.973|0.893|2.8e-11|1.1e-12|1.9e-03|-4.231066e+01 -4.231251e+01| 0:0:00| chol  2↙
2
34|0.876|0.975|3.9e-12|1.5e-12|8.1e-04|-4.231164e+01 -4.231245e+01| 0:0:00| chol  2↙
2
35|1.000|0.907|2.1e-12|1.1e-12|1.5e-04|-4.231228e+01 -4.231243e+01| 0:0:00| chol  2↙
2
36|0.652|0.975|2.3e-12|1.0e-12|7.1e-05|-4.231235e+01 -4.231242e+01| 0:0:00| chol  2↙
2
37|0.890|1.000|2.5e-12|1.0e-12|1.9e-05|-4.231240e+01 -4.231242e+01| 0:0:00| chol  3↙
3
38|1.000|0.917|2.7e-11|1.1e-12|9.6e-06|-4.231241e+01 -4.231242e+01| 0:0:00| chol  3↙
3
39|0.984|1.000|1.6e-11|1.5e-12|8.3e-07|-4.231242e+01 -4.231242e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 39
 primal objective value = -4.23124210e+01
 dual   objective value = -4.23124218e+01
 gap := trace(XZ)       = 8.35e-07
 relative gap           = 9.75e-09
 actual relative gap    = 9.62e-09
 rel. primal infeas     = 1.60e-11
 rel. dual   infeas     = 1.50e-12
 norm(X), norm(y), norm(Z) = 7.0e+01, 6.1e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 1.1e+04, 3.2e+03, 7.7e+01
 Total CPU time (secs)  = 0.28
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.9e-11  0.0e+00  2.1e-12  0.0e+00  9.6e-09  9.7e-09
-----------------------------------------------------------------

ans =

   42.3124

Iteration   4   Total error is: 0.029084

 num. of constraints = 25
 dim. of socp   var  = 26,   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|5.1e+03|1.8e+10| 3.200260e+08  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.969|0.853|3.1e-02|7.5e+02|3.0e+09| 3.038032e+08  1.993512e+03| 0:0:00| chol  1↙
1
```

```
 2|1.000|0.777|2.4e-10|1.7e+02|1.5e+09| 4.296376e+08 -1.197906e+06| 0:0:00| chol  1↙
1
 3|0.510|0.552|3.7e-10|7.5e+01|9.3e+08| 4.177602e+08 -1.949800e+06| 0:0:00| chol  1↙
1
 4|0.284|0.489|3.5e-10|3.8e+01|7.1e+08| 4.141536e+08 -3.272610e+06| 0:0:00| chol  1↙
1
 5|0.289|0.409|3.1e-10|2.3e+01|5.8e+08| 4.005085e+08 -4.630112e+06| 0:0:00| chol  1↙
1
 6|0.210|0.535|2.8e-10|1.1e+01|4.8e+08| 3.836376e+08 -6.090499e+06| 0:0:00| chol  1↙
2
 7|0.369|0.326|1.4e-09|7.1e+00|4.1e+08| 3.450255e+08 -7.134797e+06| 0:0:00| chol  2↙
2
 8|0.186|0.741|1.8e-09|1.8e+00|3.5e+08| 3.248993e+08 -5.737250e+06| 0:0:00| chol  1↙
2
 9|0.220|0.157|2.1e-09|1.5e+00|3.3e+08| 3.018405e+08 -6.593203e+06| 0:0:00| chol  2↙
2
10|0.273|0.283|1.7e-09|1.1e+00|2.9e+08| 2.651768e+08 -5.923174e+06| 0:0:00| chol  2↙
2
11|0.097|0.314|1.3e-07|7.6e-01|2.8e+08| 2.592905e+08 -5.308045e+06| 0:0:00| chol  2↙
2
12|0.086|0.182|1.4e-07|6.2e-01|2.7e+08| 2.528944e+08 -5.739039e+06| 0:0:00| chol  2↙
2
13|0.087|0.084|2.0e-07|5.7e-01|2.6e+08| 2.460748e+08 -6.090548e+06| 0:0:00| chol  2↙
2
14|0.055|0.075|8.9e-07|5.3e-01|2.6e+08| 2.431736e+08 -6.345958e+06| 0:0:00| chol  2↙
2
15|0.044|0.091|2.3e-06|4.8e-01|2.6e+08| 2.410415e+08 -6.522225e+06| 0:0:00| chol  2↙
2
16|0.042|0.176|1.8e-06|3.9e-01|2.5e+08| 2.391774e+08 -6.351969e+06| 0:0:00| chol  2↙
* 3
17|0.059|0.134|1.9e-06|3.4e-01|2.5e+08| 2.361713e+08 -6.303530e+06| 0:0:00| chol  2↙
2
18|0.051|0.196|1.6e-06|2.7e-01|2.5e+08| 2.338953e+08 -6.128409e+06| 0:0:00| chol  2↙
2
19|0.070|0.080|5.4e-07|2.5e-01|2.4e+08| 2.293002e+08 -6.211026e+06| 0:0:00| chol  2↙
3
20|0.041|0.109|5.3e-06|2.3e-01|2.4e+08| 2.276731e+08 -6.400200e+06| 0:0:00| chol  2↙
* 3
21|0.048|0.112|5.3e-06|2.0e-01|2.4e+08| 2.252557e+08 -6.429796e+06| 0:0:00| chol  2↙
2
22|0.046|0.222|2.5e-06|1.6e-01|2.4e+08| 2.234926e+08 -6.170888e+06| 0:0:00| chol  2↙
2
23|0.071|0.094|2.2e-06|1.4e-01|2.3e+08| 2.203222e+08 -6.285906e+06| 0:0:00| chol  2↙
* 3
24|0.041|0.218|2.0e-06|1.1e-01|2.3e+08| 2.189829e+08 -6.266919e+06| 0:0:00| chol  2↙
2
25|0.074|0.146|2.4e-06|9.4e-02|2.3e+08| 2.160339e+08 -6.314453e+06| 0:0:00| chol  2↙
2
26|0.034|0.228|2.9e-06|7.3e-02|2.3e+08| 2.152476e+08 -5.193659e+06| 0:0:00| chol  2↙
2
27|0.047|0.353|2.9e-06|4.7e-02|2.2e+08| 2.125955e+08 -5.446125e+06| 0:0:00| chol  2↙
2
28|0.140|0.204|4.0e-06|3.7e-02|2.2e+08| 2.064862e+08 -5.899677e+06| 0:0:00| chol  2↙
2
```

```
29|0.157|0.195|1.7e-05|3.0e-02|2.1e+08| 1.994106e+08 -6.578729e+06| 0:0:00| chol  2↙
2
30|0.142|0.239|4.9e-05|2.3e-02|2.0e+08| 1.939276e+08 -7.375862e+06| 0:0:00| chol  2↙
2
31|0.192|1.000|2.1e-05|9.6e-07|1.9e+08| 1.896011e+08 -4.458675e+06| 0:0:00| chol  2↙
2
32|0.745|0.570|9.6e-07|1.8e-06|1.7e+08| 1.636898e+08 -8.761798e+06| 0:0:00| chol  2↙
2
33|0.356|1.000|1.5e-06|1.9e-07|1.6e+08| 1.515762e+08 -8.566034e+06| 0:0:00| chol  2↙
2
34|1.000|1.000|1.8e-07|2.9e-07|1.1e+08| 1.011333e+08 -7.926384e+06| 0:0:00| chol  2↙
2
35|1.000|1.000|3.2e-06|3.7e-08|3.1e+07| 2.853233e+07 -2.639159e+06| 0:0:00| chol  2↙
2
36|1.000|1.000|1.3e-06|5.5e-08|1.3e+07| 1.195028e+07 -1.391884e+06| 0:0:00| chol  1↙
2
37|1.000|1.000|5.9e-07|8.3e-08|4.7e+06| 4.123215e+06 -5.819144e+05| 0:0:00| chol  1↙
2
38|1.000|1.000|8.1e-08|1.2e-07|2.2e+06| 1.919000e+06 -3.183427e+05| 0:0:00| chol  1↙
1
39|1.000|1.000|9.4e-08|1.6e-08|9.3e+05| 7.831583e+05 -1.451061e+05| 0:0:00| chol  1↙
2
40|1.000|1.000|1.0e-08|1.9e-08|3.8e+05| 3.062499e+05 -7.191938e+04| 0:0:00| chol  1↙
2
41|1.000|1.000|5.8e-10|2.1e-09|1.5e+05| 1.246828e+05 -2.989286e+04| 0:0:00| chol  1↙
1
42|1.000|1.000|2.6e-09|1.2e-10|6.0e+04| 4.689258e+04 -1.355071e+04| 0:0:00| chol  1↙
1
43|1.000|1.000|2.7e-10|1.7e-10|2.3e+04| 1.796789e+04 -5.047817e+03| 0:0:00| chol  1↙
1
44|1.000|1.000|7.4e-11|5.5e-11|8.3e+03| 6.227837e+03 -2.071292e+03| 0:0:00| chol  1↙
1
45|1.000|1.000|7.1e-11|1.5e-11|3.1e+03| 2.357207e+03 -7.489175e+02| 0:0:00| chol  1↙
1
46|1.000|1.000|7.1e-11|1.4e-11|1.1e+03| 7.424966e+02 -3.084769e+02| 0:0:00| chol  1↙
1
47|1.000|1.000|1.3e-11|1.4e-11|4.1e+02| 2.746023e+02 -1.373278e+02| 0:0:00| chol  1↙
1
48|1.000|1.000|3.6e-11|2.6e-12|1.3e+02| 5.153598e+01 -7.687489e+01| 0:0:00| chol  1↙
1
49|1.000|1.000|9.3e-12|3.9e-12|5.3e+01|-3.472791e+00 -5.644654e+01| 0:0:00| chol  1↙
1
50|1.000|1.000|3.2e-13|1.9e-12|1.5e+01|-3.332160e+01 -4.877537e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -3.33216025e+01
 dual   objective value = -4.87753660e+01
 gap := trace(XZ)       = 1.55e+01
 relative gap           = 1.86e-01
 actual relative gap    = 1.86e-01
 rel. primal infeas     = 3.19e-13
 rel. dual   infeas     = 1.86e-12
 norm(X), norm(y), norm(Z) = 2.2e+04, 6.3e+01, 2.6e+01
```

```
 norm(A), norm(b), norm(C) = 8.4e+05, 5.2e+05, 7.7e+01
 Total CPU time (secs)  = 0.33
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 3.9e-13  0.0e+00  2.7e-12  0.0e+00  1.9e-01  1.9e-01
------------------------------------------------------------------

ans =

   48.0570

Iteration   5   Total error is: 0.029087

 num. of constraints = 25
 dim. of socp   var  = 26,   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|2.1e+03|9.8e+09| 1.733830e+08  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.867|0.804|1.3e-01|4.2e+02|2.2e+09| 1.726982e+08 -1.599812e+03| 0:0:00| chol  1↙
1
 2|0.896|0.714|1.4e-02|1.2e+02|1.2e+09| 2.484425e+08 -5.681662e+05| 0:0:00| chol  1↙
1
 3|0.607|0.547|5.4e-03|5.4e+01|8.0e+08| 2.813234e+08 -1.299468e+06| 0:0:00| chol  1↙
1
 4|0.329|0.434|3.6e-03|3.1e+01|6.2e+08| 2.934264e+08 -2.263921e+06| 0:0:00| chol  1↙
1
 5|0.221|0.407|2.8e-03|1.8e+01|5.0e+08| 2.944210e+08 -3.588200e+06| 0:0:00| chol  1↙
1
 6|0.199|0.396|2.3e-03|1.1e+01|4.2e+08| 2.881429e+08 -5.316658e+06| 0:0:00| chol  2↙
2
 7|0.188|0.414|1.8e-03|6.4e+00|3.6e+08| 2.764310e+08 -7.549356e+06| 0:0:00| chol  1↙
1
 8|0.216|0.404|1.4e-03|3.8e+00|3.2e+08| 2.585672e+08 -1.000792e+07| 0:0:00| chol  2↙
2
 9|0.208|0.462|1.1e-03|2.1e+00|2.8e+08| 2.387368e+08 -1.242756e+07| 0:0:00| chol  1↙
2
10|0.293|0.368|8.1e-04|1.3e+00|2.5e+08| 2.110232e+08 -1.415235e+07| 0:0:00| chol  2↙
2
11|0.203|0.571|6.5e-04|5.6e-01|2.2e+08| 1.931727e+08 -1.349399e+07| 0:0:00| chol  2↙
2
12|0.309|0.167|4.5e-04|4.7e-01|2.0e+08| 1.677662e+08 -1.434402e+07| 0:0:00| chol  2↙
2
13|0.119|0.710|3.9e-04|1.3e-01|1.8e+08| 1.600285e+08 -8.548947e+06| 0:0:00| chol  2↙
2
14|0.104|0.093|3.5e-04|1.2e-01|1.7e+08| 1.521872e+08 -9.418090e+06| 0:0:00| chol  2↙
2
15|0.076|0.029|3.3e-04|1.2e-01|1.7e+08| 1.485093e+08 -9.512487e+06| 0:0:00| chol  2↙
```

```
2
16|0.002|0.057|3.2e-04|1.1e-01|1.7e+08| 1.487765e+08 -8.751990e+06| 0:0:00| chol  2↙
2
17|0.080|0.240|3.0e-04|8.5e-02|1.6e+08| 1.429071e+08 -8.538184e+06| 0:0:00| chol  2↙
2
18|0.034|0.300|2.9e-04|5.9e-02|1.6e+08| 1.409716e+08 -8.662355e+06| 0:0:00| chol  2↙
2
19|0.076|0.060|2.8e-04|5.6e-02|1.5e+08| 1.373847e+08 -9.129152e+06| 0:0:00| chol  2↙
2
20|0.029|0.145|2.6e-04|4.8e-02|1.5e+08| 1.365552e+08 -9.580375e+06| 0:0:00| chol  2↙
2
21|0.047|0.229|2.5e-04|3.7e-02|1.5e+08| 1.346842e+08 -9.922573e+06| 0:0:00| chol  2↙
2
22|0.085|0.103|2.2e-04|3.3e-02|1.5e+08| 1.315063e+08 -1.033771e+07| 0:0:00| chol  2↙
2
23|0.034|0.253|2.1e-04|2.5e-02|1.5e+08| 1.306713e+08 -1.076863e+07| 0:0:00| chol  2↙
2
24|0.089|0.301|2.0e-04|1.7e-02|1.4e+08| 1.279901e+08 -1.125918e+07| 0:0:00| chol  2↙
2
25|0.123|1.000|1.6e-04|3.9e-05|1.3e+08| 1.248610e+08 -9.775833e+06| 0:0:00| chol  2↙
2
26|0.335|0.674|1.1e-04|4.6e-05|1.3e+08| 1.178930e+08 -1.379930e+07| 0:0:00| chol  2↙
2
27|0.110|0.974|1.0e-04|2.4e-05|1.3e+08| 1.148143e+08 -1.950945e+07| 0:0:00| chol  2↙
2
28|1.000|0.655|3.7e-05|2.9e-05|1.0e+08| 9.143303e+07 -1.229355e+07| 0:0:00| chol  2↙
2
29|0.780|1.000|1.5e-06|7.4e-06|5.5e+07| 3.998921e+07 -1.537156e+07| 0:0:00| chol  1↙
1
30|1.000|1.000|3.5e-07|3.1e-07|2.6e+07| 2.197244e+07 -3.914388e+06| 0:0:00| chol  1↙
2
31|0.893|1.000|1.9e-06|7.0e-08|6.2e+06| 4.777090e+06 -1.432848e+06| 0:0:00| chol  1↙
2
32|1.000|1.000|4.2e-07|1.1e-07|3.1e+06| 2.517236e+06 -5.742856e+05| 0:0:00| chol  1↙
2
33|0.996|1.000|3.8e-09|8.4e-08|9.3e+05| 6.705572e+05 -2.609482e+05| 0:0:00| chol  1↙
2
34|1.000|1.000|3.5e-08|7.7e-10|4.2e+05| 3.316142e+05 -9.227959e+04| 0:0:00| chol  1↙
2
35|1.000|1.000|2.3e-09|1.2e-09|1.3e+05| 9.814659e+04 -3.573611e+04| 0:0:00| chol  1↙
1
36|1.000|1.000|8.9e-10|4.5e-10|5.6e+04| 4.342551e+04 -1.267492e+04| 0:0:00| chol  1↙
2
37|1.000|1.000|2.1e-11|1.8e-10|1.7e+04| 1.264711e+04 -4.707520e+03| 0:0:00| chol  1↙
1
38|1.000|1.000|7.5e-11|4.2e-12|7.3e+03| 5.639021e+03 -1.685477e+03| 0:0:00| chol  1↙
1
39|1.000|1.000|1.1e-11|6.2e-12|2.2e+03| 1.591764e+03 -6.312164e+02| 0:0:00| chol  1↙
1
40|1.000|1.000|1.4e-11|2.3e-12|9.5e+02| 6.988753e+02 -2.484654e+02| 0:0:00| chol  1↙
1
41|1.000|1.000|1.4e-11|2.8e-12|2.8e+02| 1.669844e+02 -1.140596e+02| 0:0:00| chol  1↙
1
42|1.000|1.000|8.6e-13|2.9e-12|1.2e+02| 5.347319e+01 -6.753353e+01| 0:0:00| chol  1↙
```

```
1
43|1.000|1.000|1.2e-11|1.0e-12|3.4e+01|-1.679598e+01 -5.103938e+01| 0:0:00| chol  1↙
1
44|1.000|1.000|1.1e-11|1.5e-12|1.5e+01|-3.077563e+01 -4.586956e+01| 0:0:00| chol  1↙
1
45|1.000|1.000|5.8e-12|2.3e-12|3.9e+00|-4.007900e+01 -4.398276e+01| 0:0:00| chol  1↙
1
46|1.000|1.000|4.6e-12|1.2e-12|1.8e+00|-4.171629e+01 -4.349717e+01| 0:0:00| chol  1↙
1
47|0.976|1.000|8.2e-13|1.0e-12|3.9e-01|-4.291023e+01 -4.329610e+01| 0:0:00| chol  1↙
1
48|1.000|1.000|1.0e-11|1.0e-12|1.8e-01|-4.308758e+01 -4.326408e+01| 0:0:00| chol  1↙
1
49|0.973|1.000|3.4e-12|1.5e-12|3.5e-02|-4.321368e+01 -4.324825e+01| 0:0:00| chol  1↙
2
50|0.992|1.000|9.6e-13|1.0e-12|1.5e-02|-4.323206e+01 -4.324668e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----------------------------------------------------------------
 number of iterations   = 50
 primal objective value = -4.32320644e+01
 dual   objective value = -4.32466780e+01
 gap := trace(XZ)       = 1.46e-02
 relative gap           = 1.67e-04
 actual relative gap    = 1.67e-04
 rel. primal infeas     = 9.61e-13
 rel. dual   infeas     = 1.00e-12
 norm(X), norm(y), norm(Z) = 3.1e+03, 6.0e+01, 2.4e+01
 norm(A), norm(b), norm(C) = 5.6e+05, 3.3e+05, 7.7e+01
 Total CPU time (secs)  = 0.44
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 1.4e-12  0.0e+00  1.4e-12  0.0e+00  1.7e-04  1.7e-04
-----------------------------------------------------------------

ans =

   43.2464

Iteration   6   Total error is: 0.029087

 num. of constraints = 25
 dim. of socp   var  = 26,   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|3.3e+04|1.1e+11| 1.867825e+09  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.925|0.813|7.5e-02|6.2e+03|2.3e+10| 1.907919e+09 -1.139244e+06| 0:0:00| chol  1↙
1
```

```
 2|0.943|0.715|4.3e-03|1.8e+03|1.3e+10| 2.752497e+09 -1.026753e+07| 0:0:00| chol  1↙
1
 3|0.564|0.494|1.9e-03|8.9e+02|9.2e+09| 3.106585e+09 -1.925355e+07| 0:0:00| chol  1↙
1
 4|0.274|0.430|1.4e-03|5.1e+02|7.1e+09| 3.239942e+09 -3.256250e+07| 0:0:00| chol  2↙
2
 5|0.219|0.396|1.1e-03|3.1e+02|5.8e+09| 3.259819e+09 -4.979463e+07| 0:0:00| chol  2↙
2
 6|0.183|0.415|8.6e-04|1.8e+02|4.8e+09| 3.196398e+09 -7.358282e+07| 0:0:00| chol  2↙
2
 7|0.215|0.391|6.8e-04|1.1e+02|4.1e+09| 3.044434e+09 -1.011022e+08| 0:0:00| chol  1↙
2
 8|0.187|0.476|5.5e-04|5.7e+01|3.5e+09| 2.860421e+09 -1.325697e+08| 0:0:00| chol  2↙
2
 9|0.307|0.343|3.8e-04|3.8e+01|3.1e+09| 2.543742e+09 -1.567430e+08| 0:0:00| chol  2↙
2
10|0.176|0.661|3.1e-04|1.3e+01|2.7e+09| 2.358630e+09 -1.472583e+08| 0:0:00| chol  2↙
2
11|0.282|0.157|2.3e-04|1.1e+01|2.5e+09| 2.099603e+09 -1.626936e+08| 0:0:00| chol  2↙
2
12|0.191|0.744|1.8e-04|2.8e+00|2.0e+09| 1.884777e+09 -8.104143e+07| 0:0:00| chol  2↙
2
13|0.087|0.120|1.7e-04|2.4e+00|2.0e+09| 1.804208e+09 -9.396273e+07| 0:0:00| chol  2↙
2
14|0.046|0.440|1.6e-04|1.4e+00|1.9e+09| 1.771972e+09 -7.317698e+07| 0:0:00| chol  2↙
2
15|0.070|0.318|1.5e-04|9.3e-01|1.9e+09| 1.724276e+09 -6.683442e+07| 0:0:00| chol  2↙
2
16|0.063|0.059|1.4e-04|8.7e-01|1.8e+09| 1.667574e+09 -7.430476e+07| 0:0:00| chol  2↙
2
17|0.028|0.039|1.4e-04|8.4e-01|1.8e+09| 1.651307e+09 -7.864615e+07| 0:0:00| chol  2↙
2
18|0.018|0.036|1.3e-04|8.1e-01|1.8e+09| 1.642545e+09 -8.335159e+07| 0:0:00| chol  2↙
2
19|0.016|0.035|1.3e-04|7.8e-01|1.8e+09| 1.632428e+09 -8.680119e+07| 0:0:00| chol *
  warning: symqmr failed: 2.0
  switch to LU factor. lu * 4   1
20|0.016|0.048|1.1e-04|7.4e-01|1.8e+09| 1.624084e+09 -9.049207e+07| 0:0:00| lu * 3↙
1
21|0.018|0.048|1.3e-04|7.1e-01|1.8e+09| 1.613795e+09 -9.357744e+07| 0:0:00| lu  2↙
1
22|0.019|0.138|1.2e-04|6.1e-01|1.8e+09| 1.604376e+09 -9.350804e+07| 0:0:00| lu * 3↙
1
23|0.028|0.058|1.1e-04|5.7e-01|1.8e+09| 1.587542e+09 -9.681164e+07| 0:0:00| lu * 3↙
1
24|0.012|0.032|1.8e-04|5.6e-01|1.8e+09| 1.582919e+09 -9.222135e+07| 0:0:00| lu  2↙
1
25|0.011|0.252|1.7e-04|4.2e-01|1.7e+09| 1.573596e+09 -9.316166e+07| 0:0:00| lu  2↙
1
26|0.051|0.043|1.7e-04|4.0e-01|1.7e+09| 1.542422e+09 -9.801270e+07| 0:0:00| lu  2↙
1
27|0.019|0.203|1.4e-04|3.2e-01|1.7e+09| 1.536662e+09 -8.736541e+07| 0:0:00| lu  2↙
1
28|0.060|0.149|1.3e-04|2.7e-01|1.7e+09| 1.488160e+09 -8.656881e+07| 0:0:00| lu  2↙
```

```
1
29|0.006|0.099|1.3e-04|2.4e-01|1.7e+09| 1.479544e+09 -9.092722e+07| 0:0:00| lu  2↙
1
30|0.045|0.139|1.1e-04|2.1e-01|1.6e+09| 1.452958e+09 -9.577310e+07| 0:0:00| lu  2↙
1
31|0.050|0.180|1.1e-04|1.7e-01|1.6e+09| 1.430199e+09 -9.715474e+07| 0:0:00| lu  2↙
1
32|0.043|0.069|1.1e-04|1.6e-01|1.6e+09| 1.406543e+09 -1.038152e+08| 0:0:00| lu  2↙
1
33|0.036|0.044|2.2e-04|1.5e-01|1.6e+09| 1.389665e+09 -1.090990e+08| 0:0:00| lu * 3↙
1
34|0.031|0.037|9.3e-04|1.5e-01|1.6e+09| 1.375934e+09 -1.141667e+08| 0:0:00| lu  2↙
1
35|0.029|0.039|7.0e-05|1.4e-01|1.6e+09| 1.364064e+09 -1.189342e+08| 0:0:00| lu  3↙
1
36|0.025|0.054|1.2e-03|1.3e-01|1.6e+09| 1.353711e+09 -1.236492e+08| 0:0:00| lu * 3↙
1
37|0.027|0.142|1.2e-03|1.1e-01|1.6e+09| 1.343944e+09 -1.168641e+08| 0:0:00| lu  2↙
1
38|0.017|0.063|1.2e-03|1.1e-01|1.6e+09| 1.334175e+09 -1.206771e+08| 0:0:00| lu  2↙
1
39|0.065|0.195|1.0e-03|8.7e-02|1.5e+09| 1.309123e+09 -1.224813e+08| 0:0:00| lu  2↙
1
40|0.072|0.065|8.8e-04|8.1e-02|1.5e+09| 1.274484e+09 -1.297861e+08| 0:0:00| lu  2↙
1
41|0.064|0.074|6.4e-04|7.5e-02|1.5e+09| 1.251930e+09 -1.370377e+08| 0:0:00| lu * 3↙
1
42|0.052|0.071|1.3e-03|7.0e-02|1.5e+09| 1.231924e+09 -1.442541e+08| 0:0:00| lu * 3↙
1
43|0.064|0.219|1.3e-03|5.5e-02|1.5e+09| 1.215732e+09 -1.434280e+08| 0:0:01| lu  2↙
1
44|0.095|0.131|8.4e-04|4.7e-02|1.5e+09| 1.180479e+09 -1.490317e+08| 0:0:01| lu  2↙
1
45|0.084|0.448|4.3e-03|2.6e-02|1.4e+09| 1.163176e+09 -1.240901e+08| 0:0:01| lu  2↙
1
46|0.203|0.371|4.5e-03|1.6e-02|1.3e+09| 1.088743e+09 -1.340404e+08| 0:0:01| lu  2↙
1
47|0.778|0.305|1.8e-03|1.1e-02|1.1e+09| 8.017267e+08 -1.559532e+08| 0:0:01| lu  2↙
1
48|0.410|0.538|4.4e-03|5.4e-03|9.9e+08| 7.344579e+08 -1.674381e+08| 0:0:01| lu  2↙
1
49|0.568|0.408|1.4e-02|3.3e-03|8.9e+08| 6.467775e+08 -1.259010e+08| 0:0:01| lu  2↙
1
50|0.920|1.000|2.2e-03|6.0e-04|4.4e+08| 2.954433e+08 -1.003732e+08| 0:0:01|
  sqlp stop: maximum number of iterations reached
------------------------------------------------------------------
 number of iterations   = 50
 primal objective value =  1.72427624e+09
 dual   objective value = -6.68344214e+07
 gap := trace(XZ)       = 1.86e+09
 relative gap           = 1.04e+00
 actual relative gap    = 1.00e+00
 rel. primal infeas     = 1.48e-04
 rel. dual   infeas     = 9.28e-01
```

```
 norm(X), norm(y), norm(Z) = 3.4e+08, 6.7e+07, 9.5e+07
 norm(A), norm(b), norm(C) = 8.7e+06, 2.9e+06, 7.7e+01
 Total CPU time (secs)  = 0.60
 CPU time per iteration = 0.01
 termination code       = -6
 DIMACS errors: 1.7e-04  0.0e+00  1.3e+00  0.0e+00  1.0e+00  1.0e+00
------------------------------------------------------------------

ans =

   2.4254e+09

Iteration   7   Total error is: 4.8273

 num. of constraints = 25
 dim. of socp   var  = 26,   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|6.3e+01|9.7e+07| 1.713784e+06  0.000000e+00| 0:0:00| chol  1↙
1
 1|0.962|0.878|3.8e-02|7.8e+00|1.4e+07| 1.602697e+06 -1.458933e+02| 0:0:00| chol  1↙
1
 2|0.866|0.637|5.1e-03|2.8e+00|8.8e+06| 2.134363e+06 -6.524571e+03| 0:0:00| chol  1↙
1
 3|0.494|0.502|2.6e-03|1.4e+00|6.4e+06| 2.352148e+06 -1.401056e+04| 0:0:00| chol  1↙
1
 4|0.298|0.440|1.8e-03|8.0e-01|4.9e+06| 2.430096e+06 -2.340089e+04| 0:0:00| chol  1↙
1
 5|0.235|0.434|1.4e-03|4.5e-01|3.9e+06| 2.420313e+06 -3.509172e+04| 0:0:00| chol  1↙
1
 6|0.232|0.437|1.1e-03|2.6e-01|3.3e+06| 2.339195e+06 -4.831656e+04| 0:0:00| chol  1↙
1
 7|0.239|0.448|8.1e-04|1.4e-01|2.8e+06| 2.201953e+06 -6.132929e+04| 0:0:00| chol  1↙
1
 8|0.255|0.431|6.1e-04|8.1e-02|2.4e+06| 2.025351e+06 -7.241212e+04| 0:0:00| chol  1↙
1
 9|0.238|0.463|4.6e-04|4.3e-02|2.1e+06| 1.858994e+06 -8.114286e+04| 0:0:00| chol  1↙
1
10|0.273|0.422|3.4e-04|2.5e-02|1.9e+06| 1.685759e+06 -8.731718e+04| 0:0:00| chol  1↙
1
11|0.255|0.632|2.5e-04|9.3e-03|1.7e+06| 1.569384e+06 -8.781283e+04| 0:0:00| chol  1↙
1
12|0.388|0.670|1.5e-04|3.1e-03|1.5e+06| 1.417160e+06 -9.488548e+04| 0:0:00| chol  1↙
2
13|0.409|1.000|9.1e-05|7.6e-05|1.4e+06| 1.335807e+06 -7.490912e+04| 0:0:00| chol  1↙
1
14|1.000|1.000|3.7e-08|4.1e-05|1.1e+06| 1.011954e+06 -1.241263e+05| 0:0:00| chol  1↙
1
```

```
15|1.000|1.000|1.3e-08|1.1e-05|5.4e+05| 4.778858e+05 -5.762563e+04| 0:0:00| chol  1↙
1
16|0.963|1.000|5.7e-09|5.6e-06|1.9e+05| 1.568761e+05 -2.912916e+04| 0:0:00| chol  1↙
1
17|1.000|1.000|2.0e-09|2.8e-06|9.7e+04| 8.320335e+04 -1.391712e+04| 0:0:00| chol  1↙
1
18|1.000|1.000|2.9e-10|1.4e-06|3.7e+04| 2.960666e+04 -6.918957e+03| 0:0:00| chol  1↙
1
19|1.000|1.000|2.1e-12|7.0e-07|1.5e+04| 1.212792e+04 -2.773888e+03| 0:0:00| chol  1↙
1
20|1.000|1.000|1.0e-10|7.0e-08|5.6e+03| 4.367697e+03 -1.268124e+03| 0:0:00| chol  1↙
1
21|1.000|1.000|4.5e-12|7.0e-09|2.3e+03| 1.793901e+03 -5.015475e+02| 0:0:00| chol  1↙
1
22|1.000|1.000|7.1e-12|7.1e-10|8.0e+02| 5.736849e+02 -2.270088e+02| 0:0:00| chol  1↙
1
23|1.000|1.000|3.6e-12|7.2e-11|3.2e+02| 2.140405e+02 -1.074706e+02| 0:0:00| chol  1↙
1
24|1.000|1.000|4.5e-12|8.0e-12|1.0e+02| 3.523606e+01 -6.476903e+01| 0:0:00| chol  1↙
1
25|1.000|1.000|3.5e-12|1.7e-12|4.1e+01|-8.778436e+00 -5.019077e+01| 0:0:00| chol  1↙
1
26|1.000|1.000|4.4e-12|1.1e-12|1.2e+01|-3.331595e+01 -4.485094e+01| 0:0:00| chol  1↙
1
27|1.000|1.000|3.2e-12|1.0e-12|5.0e+00|-3.836797e+01 -4.338044e+01| 0:0:00| chol  1↙
1
28|1.000|1.000|5.0e-13|1.0e-12|1.2e+00|-4.164453e+01 -4.281470e+01| 0:0:00| chol  1↙
1
29|1.000|1.000|2.2e-13|1.0e-12|5.5e-01|-4.215413e+01 -4.270303e+01| 0:0:00| chol  1↙
1
30|0.964|1.000|4.4e-12|1.0e-12|1.1e-01|-4.254427e+01 -4.265198e+01| 0:0:00| chol  1↙
1
31|1.000|1.000|4.7e-11|1.0e-12|4.7e-02|-4.259921e+01 -4.264663e+01| 0:0:00| chol  1↙
1
32|0.982|0.960|3.7e-12|1.5e-12|8.0e-03|-4.263566e+01 -4.264368e+01| 0:0:00| chol  2↙
2
33|0.873|1.000|9.6e-13|1.0e-12|3.8e-03|-4.263955e+01 -4.264335e+01| 0:0:00| chol  2↙
2
34|0.972|0.992|1.2e-12|1.0e-12|7.0e-04|-4.264253e+01 -4.264323e+01| 0:0:00| chol  2↙
2
35|0.692|0.930|3.0e-12|1.1e-12|3.1e-04|-4.264291e+01 -4.264322e+01| 0:0:00| chol  2↙
2
36|1.000|1.000|3.3e-12|1.0e-12|8.4e-05|-4.264313e+01 -4.264322e+01| 0:0:00| chol  2↙
2
37|1.000|0.995|6.3e-11|1.0e-12|8.1e-06|-4.264321e+01 -4.264322e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 37
 primal objective value = -4.26432072e+01
 dual   objective value = -4.26432153e+01
 gap := trace(XZ)       = 8.07e-06
 relative gap           = 9.36e-08
 actual relative gap    = 9.35e-08
 rel. primal infeas     = 6.27e-11
```

```
 rel. dual   infeas     = 1.01e-12
 norm(X), norm(y), norm(Z) = 3.8e+01, 6.1e+01, 2.4e+01
 norm(A), norm(b), norm(C) = 1.1e+04, 4.1e+03, 7.7e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.1e-10  0.0e+00  1.4e-12  0.0e+00  9.3e-08  9.4e-08
------------------------------------------------------------------------

ans =

   42.6432

Iteration   8   Total error is: 0.029086
The total representation error of the testing signals is: 0.010067
>>
```