

```
>> demo_Polynomial_Dictionary_Learning
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```
Starting to train the dictionary
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```
solving the quadratic problem with YALMIP...
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```
num. of constraints = 85
dim. of socp var = 86, num. of socp blk = 1
dim. of linear var = 590
*****
```

```
SDPT3: Infeasible path-following algorithms
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*****
```

```
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	8.0e+01	1.1e+07	1.511011e+04	0.000000e+00	0:0:00	chol	1	1	
1	1.000	0.987	7.6e-07	1.2e+00	1.8e+05	1.659918e+04	-8.958916e+01	0:0:00	chol	1	1	
2	1.000	0.974	1.0e-06	5.9e-02	1.9e+04	1.195892e+04	-2.996674e+01	0:0:00	chol	1	1	
3	0.953	0.947	1.7e-07	1.1e-02	1.8e+03	1.416527e+03	-3.101787e+01	0:0:00	chol	2	2	
4	0.524	0.305	2.3e-06	8.6e-03	1.5e+03	1.116189e+03	-3.215829e+01	0:0:00	chol	2	2	
5	0.184	0.882	1.9e-06	1.7e-03	1.2e+03	1.049461e+03	-3.834857e+01	0:0:00	chol	2	2	
6	0.663	0.554	6.4e-07	8.9e-04	8.0e+02	6.947721e+02	-3.660135e+01	0:0:00	chol	2	2	
7	1.000	0.864	1.2e-08	1.8e-04	3.3e+02	2.794759e+02	-3.632207e+01	0:0:00	chol	3	3	
8	0.899	0.860	1.3e-08	4.4e-05	9.9e+01	6.173318e+01	-3.518696e+01	0:0:00	chol	2	2	
9	1.000	1.000	3.3e-09	6.3e-06	4.4e+01	9.451413e+00	-3.461465e+01	0:0:00	chol	2	2	
10	1.000	1.000	5.3e-10	1.9e-06	2.0e+01	-1.465574e+01	-3.416396e+01	0:0:00	chol	2	2	
11	1.000	1.000	3.0e-10	5.7e-07	1.1e+01	-2.272053e+01	-3.392438e+01	0:0:00	chol	2	2	
12	1.000	1.000	4.2e-10	5.7e-08	3.7e+00	-3.004744e+01	-3.373713e+01	0:0:00	chol	2	2	
13	1.000	1.000	2.5e-10	5.8e-09	1.5e+00	-3.212872e+01	-3.360971e+01	0:0:00	chol	2	2	
14	1.000	0.938	3.6e-10	9.4e-10	2.2e-01	-3.333831e+01	-3.356278e+01	0:0:00	chol	3	3	
15	0.701	1.000	1.9e-10	1.3e-10	1.1e-01	-3.344852e+01	-3.355379e+01	0:0:00	chol	3	3	
16	0.923	0.951	3.5e-10	5.0e-11	1.4e-02	-3.353713e+01	-3.355145e+01	0:0:00	chol	4	4	
17	0.969	0.980	1.2e-09	5.9e-11	9.8e-04	-3.355013e+01	-3.355110e+01	0:0:00	chol	6	6	
18	0.971	0.982	4.5e-09	8.7e-11	3.5e-05	-3.355105e+01	-3.355108e+01	0:0:00	chol			
linsysolve: Schur complement matrix not positive definite												
switch to LU factor. lu 30 ^16												
19	0.124	0.140	3.7e-08	2.0e-10	3.2e-05	-3.355107e+01	-3.355108e+01	0:0:00	lu 30	30		
20	0.017	0.037	4.0e-08	3.9e-10	3.3e-05	-3.355108e+01	-3.355108e+01	0:0:00	lu 13	^12		
21	0.143	0.180	3.4e-08	6.1e-10	3.2e-05	-3.355105e+01	-3.355108e+01	0:0:00				

```
stop: progress is too slow
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```
stop: progress is bad
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```
lack of progress in infeas
```

```
-----
number of iterations = 21
primal objective value = -3.35510500e+01
dual objective value = -3.35510791e+01
gap := trace(XZ) = 3.51e-05
relative gap = 5.15e-07
actual relative gap = 4.28e-07
rel. primal infeas = 4.53e-09
rel. dual infeas = 8.70e-11
norm(X), norm(y), norm(Z) = 2.5e+02, 5.9e+01, 1.6e+01
norm(A), norm(b), norm(C) = 1.0e+03, 9.0e+02, 7.6e+01
Total CPU time (secs) = 0.22
CPU time per iteration = 0.01
termination code = -5
```

DIMACS errors: 1.1e-08 0.0e+00 1.2e-10 0.0e+00 4.3e-07 5.2e-07

ans =

33.5511

num. of constraints = 85
 dim. of socp var = 86, num. of socp blk = 1
 dim. of linear var = 590

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	8.0e+01	6.2e+07	8.802392e+04	0.000000e+00	0:0:00	chol	1 1
1	1.000	0.988	1.6e-06	1.1e+00	9.4e+05	8.964936e+04	-1.878071e+02	0:0:00	chol	1 2
2	1.000	0.956	4.9e-07	1.3e-01	1.3e+05	5.864150e+04	-1.691440e+01	0:0:00	chol	1 2
3	0.837	1.000	1.7e-07	4.0e-02	3.0e+04	2.008336e+04	-3.470260e+01	0:0:00	chol	2 2
4	1.000	1.000	8.2e-07	1.2e-02	8.3e+03	6.456500e+03	-2.742353e+01	0:0:00	chol	2 2
5	0.917	0.929	6.9e-08	4.2e-03	1.1e+03	7.941806e+02	-2.401190e+01	0:0:00	chol	2 2
6	1.000	0.848	1.5e-08	1.6e-03	6.2e+02	5.074718e+02	-2.174759e+01	0:0:00	chol	2 2
7	1.000	1.000	2.9e-09	3.2e-04	2.9e+02	2.525614e+02	-2.011327e+01	0:0:00	chol	2 2
8	0.869	1.000	3.7e-09	9.7e-05	1.4e+02	1.119808e+02	-1.877792e+01	0:0:00	chol	2 3
9	1.000	0.976	5.9e-09	3.1e-05	6.5e+01	4.513190e+01	-1.814492e+01	0:0:00	chol	2 2
10	0.853	1.000	9.1e-10	8.8e-06	3.7e+01	1.919056e+01	-1.797046e+01	0:0:00	chol	3 2
11	1.000	1.000	8.3e-10	2.6e-06	2.2e+01	4.474234e+00	-1.756185e+01	0:0:00	chol	3 3
12	0.993	1.000	2.0e-09	7.9e-07	6.0e+00	-1.126825e+01	-1.723620e+01	0:0:00	chol	3 3
13	1.000	1.000	7.6e-10	2.4e-07	2.9e+00	-1.417266e+01	-1.708708e+01	0:0:00	chol	3 3
14	0.955	1.000	1.1e-09	7.1e-08	6.5e-01	-1.635496e+01	-1.700116e+01	0:0:00	chol	3 3
15	1.000	1.000	7.0e-10	2.1e-08	2.6e-01	-1.672174e+01	-1.698420e+01	0:0:00	chol	3 3
16	0.998	0.752	2.6e-09	1.0e-08	2.4e-02	-1.695245e+01	-1.697604e+01	0:0:00	chol	4 4
17	0.950	0.903	1.6e-09	2.9e-09	4.5e-03	-1.696892e+01	-1.697341e+01	0:0:00	chol	8 8
18	0.958	0.975	4.9e-09	9.5e-10	2.5e-04	-1.697277e+01	-1.697302e+01	0:0:00	chol	
linsysolve: Schur complement matrix not positive definite										
switch to LU factor. lu 30 30										
19	0.992	0.973	6.8e-09	2.9e-10	1.4e-05	-1.697297e+01	-1.697301e+01	0:0:00	lu 30	30
20	1.000	0.945	2.0e-08	2.0e-10	9.4e-06	-1.697294e+01	-1.697301e+01	0:0:00	lu 30	^19
21	0.785	0.747	6.1e-08	9.8e-11	2.5e-06	-1.697299e+01	-1.697301e+01	0:0:00		
stop: max(relative gap, infeasibilities) < 1.00e-07										

number of iterations = 21
 primal objective value = -1.69729863e+01
 dual objective value = -1.69730065e+01
 gap := trace(XZ) = 2.53e-06
 relative gap = 7.23e-08
 actual relative gap = 5.78e-07
 rel. primal infeas = 6.08e-08
 rel. dual infeas = 9.84e-11
 norm(X), norm(y), norm(Z) = 6.3e+02, 8.6e+01, 5.2e+01
 norm(A), norm(b), norm(C) = 1.8e+03, 2.1e+03, 7.6e+01
 Total CPU time (secs) = 0.23

```

CPU time per iteration = 0.01
termination code       = 0
DIMACS errors: 1.5e-07  0.0e+00  1.4e-10  0.0e+00  5.8e-07  7.2e-08
-----

```

```
ans =
```

```
16.9730
```

```
Iteration    2    Total error is: 0.016598
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```

num. of constraints = 85
dim. of socp var   = 86,    num. of socp blk = 1
dim. of linear var = 590

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```
SDPT3: Infeasible path-following algorithms
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```

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	8.0e+01	5.3e+07	7.551481e+04	0.000000e+00	0:0:00	chol	1	1
1	1.000	0.988	1.4e-06	1.1e+00	8.2e+05	7.696214e+04	-1.593821e+02	0:0:00	chol	1	1
2	1.000	0.943	3.9e-07	1.4e-01	1.2e+05	5.106358e+04	-2.005957e+01	0:0:00	chol	2	2
3	0.683	1.000	1.8e-07	4.0e-02	4.1e+04	2.797455e+04	-5.160116e+01	0:0:00	chol	2	2
4	1.000	1.000	6.4e-07	1.2e-02	9.9e+03	7.740665e+03	-3.549174e+01	0:0:00	chol	2	2
5	0.923	0.923	7.3e-08	4.2e-03	1.2e+03	8.811906e+02	-2.930567e+01	0:0:00	chol	2	2
6	0.774	0.758	5.6e-08	1.8e-03	8.1e+02	6.559238e+02	-2.405749e+01	0:0:00	chol	2	2
7	1.000	0.998	7.6e-09	3.3e-04	4.1e+02	3.647190e+02	-2.175251e+01	0:0:00	chol	2	2
8	0.814	0.906	3.5e-08	1.2e-04	2.2e+02	1.883932e+02	-1.917916e+01	0:0:00	chol	3	3
9	1.000	1.000	1.6e-08	2.9e-05	1.0e+02	8.331131e+01	-1.791850e+01	0:0:00	chol	3	3
10	1.000	1.000	1.2e-09	8.8e-06	4.3e+01	2.514255e+01	-1.745903e+01	0:0:00	chol	3	3
11	1.000	1.000	1.6e-09	2.6e-06	2.2e+01	5.508281e+00	-1.660950e+01	0:0:00	chol	3	3
12	0.987	1.000	1.3e-09	7.9e-07	6.1e+00	-1.028711e+01	-1.633621e+01	0:0:00	chol	3	3
13	1.000	1.000	7.8e-10	2.4e-07	2.8e+00	-1.333699e+01	-1.615918e+01	0:0:00	chol	3	2
14	0.891	0.988	1.3e-09	7.3e-08	6.4e-01	-1.544907e+01	-1.609055e+01	0:0:00	chol	3	3
15	1.000	0.739	1.7e-10	2.5e-08	3.4e-01	-1.574196e+01	-1.608406e+01	0:0:00	chol	3	3
16	0.992	0.912	1.0e-09	2.8e-09	6.3e-02	-1.601061e+01	-1.607387e+01	0:0:00	chol	3	3
17	0.963	0.967	8.8e-10	2.2e-10	3.5e-03	-1.606768e+01	-1.607113e+01	0:0:00	chol	5	6
18	0.986	0.988	1.0e-09	8.8e-11	4.8e-05	-1.607095e+01	-1.607100e+01	0:0:00	chol		
linsysolve: Schur complement matrix not positive definite											
switch to LU factor. lu 30 ^ 9											
19	0.974	0.942	6.9e-09	7.6e-11	2.6e-06	-1.607103e+01	-1.607100e+01	0:0:00			
stop: max(relative gap, infeasibilities) < 1.00e-07											

```

number of iterations    = 19
primal objective value  = -1.60710299e+01
dual   objective value  = -1.60709998e+01
gap := trace(XZ)        = 2.63e-06
relative gap            = 7.92e-08
actual relative gap     = -9.07e-07
rel. primal infeas      = 6.86e-09
rel. dual   infeas      = 7.57e-11
norm(X), norm(y), norm(Z) = 4.0e+02, 8.7e+01, 5.2e+01
norm(A), norm(b), norm(C) = 2.2e+03, 2.5e+03, 7.6e+01

```

```

Total CPU time (secs) = 0.18
CPU time per iteration = 0.01
termination code      = 0
DIMACS errors: 1.8e-08  0.0e+00  1.1e-10  0.0e+00  -9.1e-07  7.9e-08
-----

```

```
ans =
```

```
16.0710
```

```
Iteration 3 Total error is: 0.016118
```

```

num. of constraints = 85
dim. of socp var = 86, num. of socp blk = 1
dim. of linear var = 590

```

```
*****
```

```
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	8.1e+01	6.7e+07	9.645904e+04	0.000000e+00	0:0:00	chol	1	1	
1	1.000	0.987	2.2e-06	1.2e+00	1.1e+06	9.736935e+04	-2.641717e+02	0:0:00	chol	2	2	
2	1.000	0.928	2.7e-07	1.6e-01	1.7e+05	6.628937e+04	-2.505139e+01	0:0:00	chol	2	2	
3	0.576	1.000	1.5e-07	4.0e-02	6.4e+04	4.410206e+04	-7.883606e+01	0:0:00	chol	2	2	
4	1.000	1.000	2.7e-07	2.0e-02	1.0e+04	6.924953e+03	-4.199239e+01	0:0:00	chol	2	2	
5	0.896	0.879	3.1e-08	7.7e-03	1.5e+03	9.867250e+02	-3.217166e+01	0:0:00	chol	2	2	
6	0.532	0.861	1.6e-08	2.6e-03	1.0e+03	8.432493e+02	-2.541326e+01	0:0:00	chol	2	2	
7	0.677	1.000	5.7e-09	5.4e-04	6.6e+02	5.991422e+02	-2.596352e+01	0:0:00	chol	2	2	
8	1.000	0.753	3.1e-09	2.6e-04	4.1e+02	3.549223e+02	-2.109527e+01	0:0:00	chol	2	2	
9	0.691	0.963	1.2e-09	5.6e-05	2.7e+02	2.389841e+02	-2.080956e+01	0:0:00	chol	2	3	
10	1.000	1.000	4.3e-09	1.5e-05	1.3e+02	1.114739e+02	-1.811829e+01	0:0:00	chol	3	3	
11	1.000	1.000	2.4e-09	4.4e-06	5.3e+01	3.599757e+01	-1.693827e+01	0:0:00	chol	3	3	
12	1.000	1.000	9.2e-10	1.3e-06	2.1e+01	4.975564e+00	-1.601549e+01	0:0:00	chol	3	3	
13	1.000	1.000	5.5e-10	3.9e-07	7.2e+00	-8.457693e+00	-1.568589e+01	0:0:00	chol	2	3	
14	1.000	1.000	3.0e-10	1.2e-07	2.7e+00	-1.277403e+01	-1.549083e+01	0:0:00	chol	2	2	
15	0.927	1.000	1.6e-10	1.2e-08	6.4e-01	-1.478360e+01	-1.542626e+01	0:0:00	chol	3	3	
16	1.000	0.840	1.5e-10	2.9e-09	3.1e-01	-1.510313e+01	-1.541642e+01	0:0:00	chol	3	3	
17	1.000	0.929	2.0e-10	3.5e-10	4.8e-02	-1.535844e+01	-1.540668e+01	0:0:00	chol	3	3	
18	0.948	0.925	3.0e-10	7.8e-11	5.6e-03	-1.539910e+01	-1.540472e+01	0:0:00	chol	4	4	
19	0.947	0.901	6.0e-10	6.9e-11	8.7e-04	-1.540362e+01	-1.540449e+01	0:0:00	chol	6	6	
20	1.000	1.000	9.0e-10	9.0e-11	9.7e-05	-1.540435e+01	-1.540445e+01	0:0:00	chol			

```
linsysolve: Schur complement matrix not positive definite
```

```
switch to LU factor. lu 14 7
```

```
21|0.997|0.947|3.3e-09|9.9e-11|3.1e-06|-1.540444e+01 -1.540445e+01| 0:0:00|
```

```
stop: max(relative gap, infeasibilities) < 1.00e-07
```

```

-----
number of iterations = 21
primal objective value = -1.54044403e+01
dual objective value = -1.54044504e+01
gap := trace(XZ) = 3.12e-06
relative gap = 9.81e-08
actual relative gap = 3.19e-07
rel. primal infeas = 3.33e-09

```

```

rel. dual   infeas   = 9.91e-11
norm(X), norm(y), norm(Z) = 3.5e+02, 8.8e+01, 5.4e+01
norm(A), norm(b), norm(C) = 2.6e+03, 3.4e+03, 7.6e+01
Total CPU time (secs) = 0.20
CPU time per iteration = 0.01
termination code = 0
DIMACS errors: 7.1e-09 0.0e+00 1.4e-10 0.0e+00 3.2e-07 9.8e-08
-----

```

ans =

15.4045

Iteration 4 Total error is: 0.015755

```

num. of constraints = 85
dim. of socp var = 86, num. of socp blk = 1
dim. of linear var = 590

```

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	8.2e+01	9.3e+07	1.329750e+05	0.000000e+00	0:0:00
1	1.000	0.987	1.7e-06	1.2e+00	1.5e+06	1.338248e+05	-3.289560e+02	0:0:00
2	1.000	0.930	2.3e-07	1.6e-01	2.3e+05	9.126937e+04	-3.513848e+01	0:0:00
3	0.567	1.000	1.4e-07	4.0e-02	8.8e+04	6.105472e+04	-1.012746e+02	0:0:00
4	1.000	1.000	2.4e-07	2.0e-02	1.4e+04	9.945102e+03	-5.240131e+01	0:0:00
5	0.918	0.902	2.5e-08	7.4e-03	1.8e+03	1.165038e+03	-3.857199e+01	0:0:00
6	0.555	0.833	1.2e-08	2.7e-03	1.3e+03	1.009794e+03	-2.817009e+01	0:0:00
7	0.829	1.000	3.2e-09	5.4e-04	7.4e+02	6.655871e+02	-2.818302e+01	0:0:00
8	0.643	0.679	4.5e-09	2.8e-04	5.7e+02	5.102315e+02	-2.204049e+01	0:0:00
9	0.704	0.920	1.8e-09	6.7e-05	3.8e+02	3.503713e+02	-2.234409e+01	0:0:00
10	1.000	1.000	4.9e-09	1.5e-05	1.7e+02	1.533488e+02	-1.880128e+01	0:0:00
11	1.000	1.000	2.0e-09	4.4e-06	7.4e+01	5.619086e+01	-1.709327e+01	0:0:00
12	1.000	1.000	1.2e-09	1.3e-06	2.9e+01	1.268826e+01	-1.588271e+01	0:0:00
13	1.000	1.000	7.3e-10	3.9e-07	1.0e+01	-5.025026e+00	-1.539682e+01	0:0:00
14	1.000	1.000	2.4e-10	1.2e-07	3.9e+00	-1.123342e+01	-1.511653e+01	0:0:00
15	0.940	1.000	1.6e-10	3.6e-08	1.0e+00	-1.402069e+01	-1.501754e+01	0:0:00
16	1.000	0.760	1.3e-10	1.1e-08	5.1e-01	-1.449585e+01	-1.500165e+01	0:0:00
17	1.000	0.886	2.8e-10	1.6e-09	7.8e-02	-1.490484e+01	-1.498310e+01	0:0:00
18	0.940	0.897	3.2e-10	2.4e-10	9.8e-03	-1.496928e+01	-1.497910e+01	0:0:00
19	0.910	0.960	5.5e-10	7.2e-11	1.0e-03	-1.497750e+01	-1.497851e+01	0:0:00
20	0.986	0.987	3.8e-10	9.0e-11	1.4e-05	-1.497846e+01	-1.497847e+01	0:0:00
linsysolve: Schur complement matrix not positive definite								
switch to LU factor. lu 30 30								
21	0.714	0.687	1.6e-08	1.0e-10	5.3e-06	-1.497855e+01	-1.497847e+01	0:0:00
22	0.097	0.077	2.2e-08	2.1e-10	5.7e-06	-1.497841e+01	-1.497847e+01	0:0:00
23	0.306	0.221	4.5e-08	2.9e-10	5.8e-06	-1.497848e+01	-1.497847e+01	0:0:00

stop: progress is too slow

stop: progress is bad

number of iterations = 23

```

primal objective value = -1.49785462e+01
dual   objective value = -1.49784743e+01
gap := trace(XZ)       = 5.34e-06
relative gap           = 1.72e-07
actual relative gap    = -2.32e-06
rel. primal infeas     = 1.57e-08
rel. dual   infeas     = 1.05e-10
norm(X), norm(y), norm(Z) = 4.6e+02, 8.9e+01, 5.5e+01
norm(A), norm(b), norm(C) = 2.8e+03, 4.3e+03, 7.6e+01
Total CPU time (secs)   = 0.22
CPU time per iteration = 0.01
termination code        = -5
DIMACS errors: 3.3e-08  0.0e+00  1.5e-10  0.0e+00  -2.3e-06  1.7e-07
-----

```

```
ans =
```

```
14.9785
```

```
Iteration    5    Total error is: 0.015514
```

```

num. of constraints = 85
dim. of socp var   = 86,   num. of socp blk = 1
dim. of linear var = 590
*****
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|8.2e+01|9.7e+07| 1.386205e+05  0.000000e+00| 0:0:00| chol 1 1
1|1.000|0.987|1.7e-06|1.2e+00|1.6e+06| 1.394285e+05 -3.357039e+02| 0:0:00| chol 2 2
2|1.000|0.929|2.2e-07|1.6e-01|2.4e+05| 9.544844e+04 -3.594011e+01| 0:0:00| chol 2 2
3|0.557|1.000|1.3e-07|4.0e-02|9.3e+04| 6.462269e+04 -1.066882e+02| 0:0:00| chol 2 2
4|1.000|1.000|2.3e-07|2.0e-02|1.4e+04| 9.933095e+03 -5.454714e+01| 0:0:00| chol 2 2
5|0.916|0.900|2.1e-08|7.4e-03|1.9e+03| 1.199475e+03 -4.018831e+01| 0:0:00| chol 2 2
6|0.554|0.830|1.1e-08|2.8e-03|1.3e+03| 1.040377e+03 -2.901661e+01| 0:0:00| chol 2 2
7|0.824|1.000|3.2e-09|5.4e-04|7.7e+02| 6.921452e+02 -2.896855e+01| 0:0:00| chol 2 2
8|0.533|0.664|2.8e-09|2.9e-04|6.2e+02| 5.630840e+02 -2.247739e+01| 0:0:00| chol 2 2
9|0.692|0.924|1.4e-09|6.7e-05|4.2e+02| 3.900787e+02 -2.293691e+01| 0:0:00| chol 2 3
10|1.000|1.000|5.0e-09|1.5e-05|1.9e+02| 1.704567e+02 -1.909878e+01| 0:0:00| chol 3 3
11|1.000|1.000|2.0e-09|4.4e-06|8.2e+01| 6.459883e+01 -1.718252e+01| 0:0:00| chol 3 3
12|1.000|1.000|1.3e-09|1.3e-06|3.1e+01| 1.544188e+01 -1.581742e+01| 0:0:00| chol 3 3
13|1.000|1.000|5.1e-10|3.9e-07|1.2e+01| -3.617374e+00 -1.525526e+01| 0:0:00| chol 3 3
14|1.000|1.000|3.2e-10|1.2e-07|4.3e+00| -1.059559e+01 -1.493731e+01| 0:0:00| chol 3 3
15|0.979|1.000|2.1e-10|3.6e-08|1.1e+00| -1.372188e+01 -1.482131e+01| 0:0:00| chol 3 3
16|1.000|0.752|1.0e-10|1.2e-08|5.6e-01| -1.423814e+01 -1.479978e+01| 0:0:00| chol 3 3
17|1.000|0.881|2.2e-10|1.7e-09|8.8e-02| -1.468876e+01 -1.477665e+01| 0:0:00| chol 3 3
18|0.940|0.882|1.9e-10|2.6e-10|1.2e-02| -1.476029e+01 -1.477188e+01| 0:0:00| chol 4 4
19|0.935|0.965|5.6e-10|5.0e-11|8.2e-04| -1.477023e+01 -1.477105e+01| 0:0:00| chol 6 8
20|0.987|0.987|4.8e-10|5.7e-11|1.1e-05| -1.477101e+01 -1.477102e+01| 0:0:00| chol
linsysolve: Schur complement matrix not positive definite
switch to LU factor. lu 30 30
21|0.983|0.829|2.2e-09|2.0e-11|5.1e-07| -1.477103e+01 -1.477102e+01| 0:0:00|

```

```
stop: max(relative gap, infeasibilities) < 1.00e-07
```

```
-----
number of iterations    = 21
primal objective value = -1.47710291e+01
dual   objective value = -1.47710182e+01
gap := trace(XZ)       = 5.11e-07
relative gap           = 1.67e-08
actual relative gap    = -3.60e-07
rel. primal infeas     = 2.17e-09
rel. dual   infeas     = 2.03e-11
norm(X), norm(y), norm(Z) = 4.7e+02, 8.9e+01, 5.5e+01
norm(A), norm(b), norm(C) = 2.9e+03, 4.6e+03, 7.6e+01
Total CPU time (secs)   = 0.22
CPU time per iteration = 0.01
termination code        = 0
DIMACS errors: 4.5e-09  0.0e+00  2.9e-11  0.0e+00  -3.6e-07  1.7e-08
-----
```

```
ans =
```

```
14.7710
```

```
Iteration    6    Total error is: 0.015395
```

```
num. of constraints = 85
dim. of socp var   = 86,   num. of socp blk = 1
dim. of linear var = 590
```

```
*****
```

```
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	8.2e+01	1.0e+08	1.429265e+05	0.000000e+00	0:0:00	chol	1	1	
1	1.000	0.987	1.7e-06	1.2e+00	1.7e+06	1.436844e+05	-3.369596e+02	0:0:00	chol	1	2	
2	1.000	0.929	2.1e-07	1.6e-01	2.5e+05	9.882962e+04	-3.694339e+01	0:0:00	chol	2	2	
3	0.549	1.000	1.3e-07	4.0e-02	9.7e+04	6.763661e+04	-1.111520e+02	0:0:00	chol	2	2	
4	1.000	1.000	2.2e-07	2.0e-02	1.4e+04	9.941067e+03	-5.654001e+01	0:0:00	chol	2	2	
5	0.915	0.898	2.0e-08	7.4e-03	1.9e+03	1.224913e+03	-4.166378e+01	0:0:00	chol	2	2	
6	0.554	0.825	9.6e-09	2.8e-03	1.3e+03	1.063262e+03	-2.978962e+01	0:0:00	chol	2	2	
7	0.821	1.000	2.9e-09	5.4e-04	7.9e+02	7.120289e+02	-2.965318e+01	0:0:00	chol	2	2	
8	0.441	0.652	4.0e-09	2.9e-04	6.6e+02	6.057117e+02	-2.290709e+01	0:0:00	chol	2	2	
9	0.680	0.923	2.3e-09	6.8e-05	4.6e+02	4.236212e+02	-2.345785e+01	0:0:00	chol	3	3	
10	1.000	1.000	9.4e-09	1.5e-05	2.1e+02	1.852712e+02	-1.940176e+01	0:0:00	chol	3	3	
11	1.000	1.000	2.2e-09	7.3e-06	9.0e+01	7.218296e+01	-1.728712e+01	0:0:00	chol	3	3	
12	1.000	1.000	9.4e-10	2.2e-06	3.3e+01	1.747494e+01	-1.576692e+01	0:0:00	chol	3	3	
13	1.000	1.000	5.5e-10	6.6e-07	1.3e+01	-2.275096e+00	-1.513377e+01	0:0:00	chol	2	2	
14	1.000	1.000	2.8e-10	2.0e-07	4.7e+00	-1.007332e+01	-1.477774e+01	0:0:00	chol	2	2	
15	1.000	1.000	1.9e-10	5.9e-08	1.2e+00	-1.344190e+01	-1.464291e+01	0:0:00	chol	3	3	
16	1.000	0.809	9.8e-11	1.6e-08	5.9e-01	-1.402828e+01	-1.461485e+01	0:0:00	chol	3	3	
17	1.000	0.852	2.6e-10	2.9e-09	7.7e-02	-1.451395e+01	-1.459068e+01	0:0:00	chol	3	3	
18	0.952	0.876	3.0e-10	4.4e-10	9.7e-03	-1.457578e+01	-1.458544e+01	0:0:00	chol	4	4	
19	0.949	0.971	4.2e-10	6.3e-11	5.4e-04	-1.458402e+01	-1.458456e+01	0:0:00	chol	9	14	
20	0.991	0.991	5.1e-10	6.7e-11	1.4e-05	-1.458451e+01	-1.458453e+01	0:0:00	chol			

```

linsysolve: Schur complement matrix not positive definite
switch to LU factor. lu 11 30
21|0.702|0.678|1.0e-08|1.2e-10|4.9e-06|-1.458456e+01 -1.458453e+01| 0:0:00| lu 23 30
22|0.202|0.208|2.5e-08|1.9e-10|5.0e-06|-1.458446e+01 -1.458453e+01| 0:0:00| lu 18 30
23|0.092|0.085|2.8e-08|2.8e-10|5.4e-06|-1.458443e+01 -1.458453e+01| 0:0:00|
stop: progress is too slow
stop: progress is bad
-----
number of iterations      = 23
primal objective value    = -1.45845551e+01
dual   objective value    = -1.45845256e+01
gap := trace(XZ)          = 4.88e-06
relative gap              = 1.62e-07
actual relative gap       = -9.77e-07
rel. primal infeas        = 1.03e-08
rel. dual   infeas        = 1.18e-10
norm(X), norm(y), norm(Z) = 4.9e+02, 8.9e+01, 5.6e+01
norm(A), norm(b), norm(C) = 2.9e+03, 4.8e+03, 7.6e+01
Total CPU time (secs)     = 0.20
CPU time per iteration    = 0.01
termination code          = -5
DIMACS errors: 2.1e-08  0.0e+00  1.7e-10  0.0e+00  -9.8e-07  1.6e-07
-----

ans =

    14.5845

Iteration   7   Total error is: 0.015283

num. of constraints = 85
dim. of socp var   = 86,   num. of socp blk   = 1
dim. of linear var = 590
*****
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|8.2e+01|1.0e+08| 1.487468e+05  0.000000e+00| 0:0:00| chol 1 1
1|1.000|0.987|1.8e-06|1.3e+00|1.7e+06| 1.494292e+05 -3.617469e+02| 0:0:00| chol 2 2
2|1.000|0.928|2.0e-07|1.7e-01|2.6e+05| 1.031686e+05 -3.960538e+01| 0:0:00| chol 2 2
3|0.539|1.000|1.2e-07|4.0e-02|1.0e+05| 7.165262e+04 -1.189663e+02| 0:0:00| chol 2 2
4|1.000|1.000|2.0e-07|2.0e-02|1.4e+04| 9.636110e+03 -5.972058e+01| 0:0:00| chol 2 2
5|0.908|0.890|2.0e-08|7.5e-03|2.0e+03| 1.302153e+03 -4.380976e+01| 0:0:00| chol 2 2
6|0.563|0.836|9.2e-09|2.7e-03|1.4e+03| 1.122960e+03 -3.096888e+01| 0:0:00| chol 2 2
7|0.821|0.991|5.0e-09|5.6e-04|8.4e+02| 7.541891e+02 -3.076809e+01| 0:0:00| chol 2 2
8|0.242|0.701|2.6e-09|2.8e-04|7.5e+02| 6.960654e+02 -2.386974e+01| 0:0:00| chol 2 2
9|0.632|0.743|2.2e-09|1.1e-04|5.4e+02| 5.027118e+02 -2.392607e+01| 0:0:00| chol 3 3
10|1.000|1.000|5.7e-09|2.4e-05|2.5e+02| 2.305567e+02 -2.021447e+01| 0:0:00| chol 3 3
11|1.000|1.000|2.5e-09|1.2e-05|1.0e+02| 8.336368e+01 -1.753466e+01| 0:0:00| chol 2 2
12|1.000|1.000|8.3e-10|3.6e-06|4.1e+01| 2.545398e+01 -1.586073e+01| 0:0:00| chol 3 3
13|1.000|1.000|5.6e-10|1.1e-06|1.5e+01| 5.151336e-02 -1.512819e+01| 0:0:00| chol 3 2
14|1.000|1.000|3.4e-10|3.3e-07|6.0e+00| -8.735670e+00 -1.468594e+01| 0:0:00| chol 2 2

```



```

15|1.000|1.000|2.4e-10|9.9e-08|1.5e+00|-1.300336e+01 -1.452328e+01| 0:0:00| chol 3 3
16|1.000|1.000|1.1e-10|9.9e-09|6.9e-01|-1.378545e+01 -1.447404e+01| 0:0:00| chol 3 3
17|0.989|0.826|1.5e-10|2.6e-09|6.7e-02|-1.438343e+01 -1.445049e+01| 0:0:00| chol 3 3
18|0.971|0.873|2.4e-10|4.4e-10|6.0e-03|-1.443897e+01 -1.444496e+01| 0:0:00| chol 4 4
19|0.969|0.968|3.0e-10|8.9e-11|2.0e-04|-1.444388e+01 -1.444408e+01| 0:0:00| chol
    linsysolve: Schur complement matrix not positive definite
    switch to LU factor. lu 30 2
20|0.989|0.987|1.6e-10|6.2e-11|8.0e-06|-1.444404e+01 -1.444405e+01| 0:0:00| lu 30 ^14
21|1.000|0.910|5.3e-10|1.9e-11|7.2e-07|-1.444404e+01 -1.444405e+01| 0:0:00|
    stop: max(relative gap, infeasibilities) < 1.00e-07

```

```

-----
number of iterations    = 21
primal objective value = -1.44440361e+01
dual   objective value = -1.44440467e+01
gap := trace(XZ)       = 7.16e-07
relative gap           = 2.39e-08
actual relative gap    = 3.53e-07
rel. primal infeas     = 5.29e-10
rel. dual   infeas     = 1.93e-11
norm(X), norm(y), norm(Z) = 5.1e+02, 9.0e+01, 5.6e+01
norm(A), norm(b), norm(C) = 3.1e+03, 5.0e+03, 7.6e+01
Total CPU time (secs)   = 0.22
CPU time per iteration = 0.01
termination code        = 0
DIMACS errors: 1.1e-09  0.0e+00  2.7e-11  0.0e+00  3.5e-07  2.4e-08
-----

```

ans =

14.4440

Iteration 8 Total error is: 0.0152

The total representation error of the testing signals is: 0.15146

>>