Appendix

I will appreciate it if you could give me some advice on my final project

December 26, 2018

1 Output Figures and Screen Printout for $s = 0.1, n = 3600$.

1.1 Output Figures ($s = 0.1, n = 3600$).

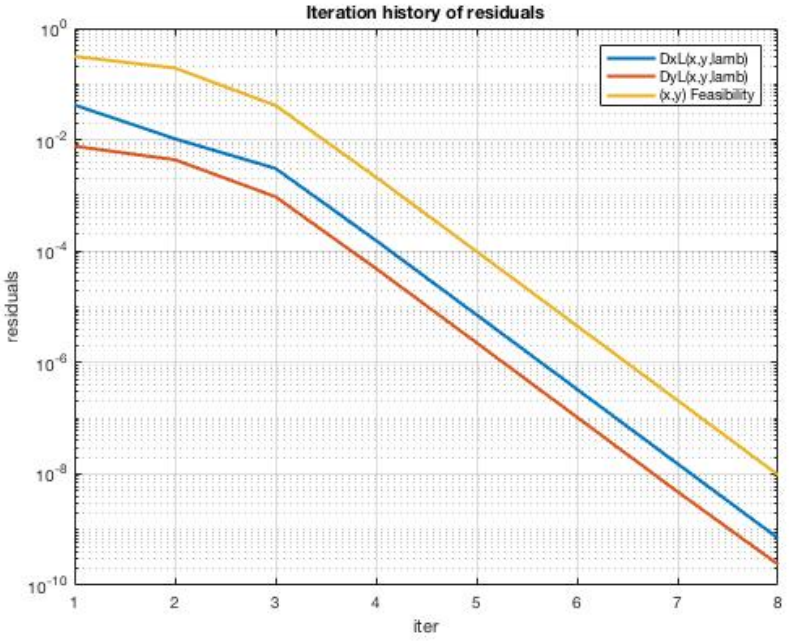

Figure 1: Iteration history residuals for my code

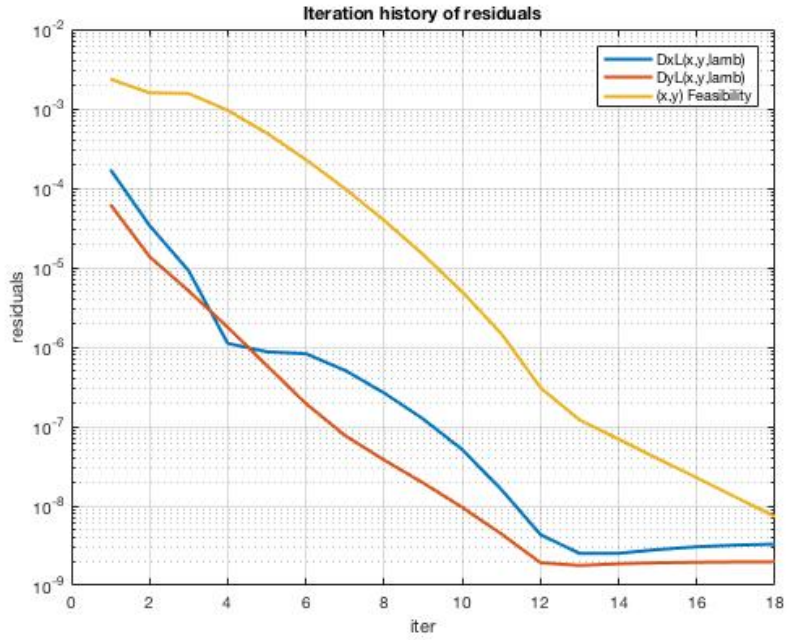

Figure 2: Iteration history residuals for instructor's code

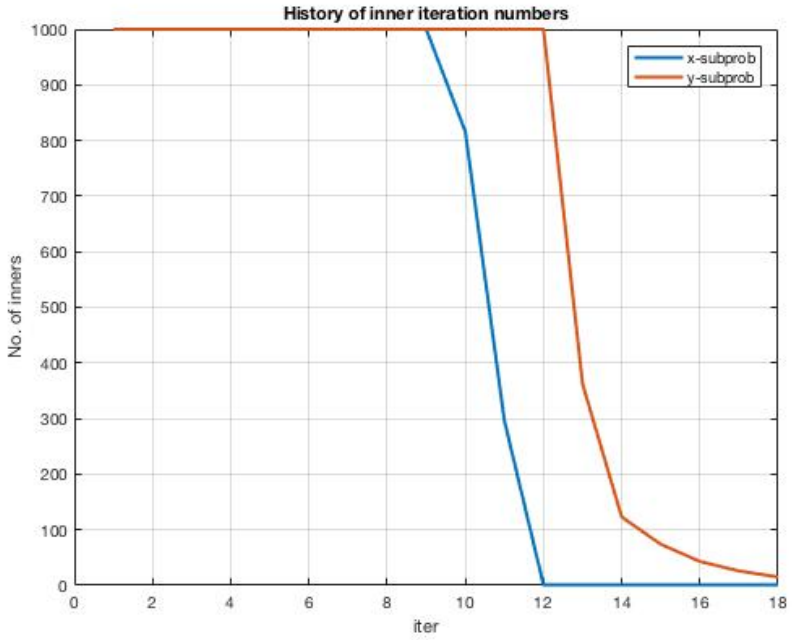

Figure 3: Historty Inner iteration Numbers for instructor's code

1.2 Screen Printout ($s = 0.1, n = 3600$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 3600
s = .1

----- solver: my_qcqp_admm  n = 3600  s = 0.10 -----
iter  1: rres = [ 4.22e-02  7.65e-03  3.14e-01]
iter  2: rres = [ 1.04e-02  4.37e-03  1.94e-01]
iter  3: rres = [ 3.06e-03  9.48e-04  4.13e-02]
iter  4: rres = [ 1.55e-04  4.88e-05  2.13e-03]
iter  5: rres = [ 7.21e-06  2.27e-06  9.89e-05]
iter  6: rres = [ 3.31e-07  1.04e-07  4.55e-06]
iter  7: rres = [ 1.52e-08  4.79e-09  2.09e-07]
iter  8: rres = [ 6.99e-10  2.38e-10  9.57e-09]
Convergence = 1 at iter 8
Elapsed time is 19.627675 seconds.
Stationarity: [4.69e-10 9.19e-11 9.57e-09]
----- solver: my_qcqp_admm  n = 3600  s = 0.10 -----


----- solver: yz_qcqp_admm  n = 3600  s = 0.10 -----
iter   1: rres = (1.71e-04 6.23e-05 2.36e-03)  time: 1.54e-01
iter  10: rres = (5.12e-08 9.58e-09 4.94e-06)  time: 1.24e+00
iter  18: rres = (3.31e-09 1.98e-09 7.37e-09)  time: 2.15e-01
Convergence = 1 at iter 18
Elapsed time is 1.612167 seconds.
Stationarity: [3.31e-09 7.19e-09 7.37e-09]
----- solver: yz_qcqp_admm  n = 3600  s = 0.10 -----


---------------------------------------
(x,y)-deviations: [6.25e-08 9.49e-08]
objective values:
                -65.086570968036995
                -65.086570968043034
Elapsed times:
                19.627735
                1.612233
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:17:49
---------------------------------------

fx >>
```

Figure 4: Historty Inner iteration Numbers for instructor's code

2 Output Figures and Screen Printout for $s = 1, n = 3600$.

2.1 Output Figures ($s = 1, n = 3600$).

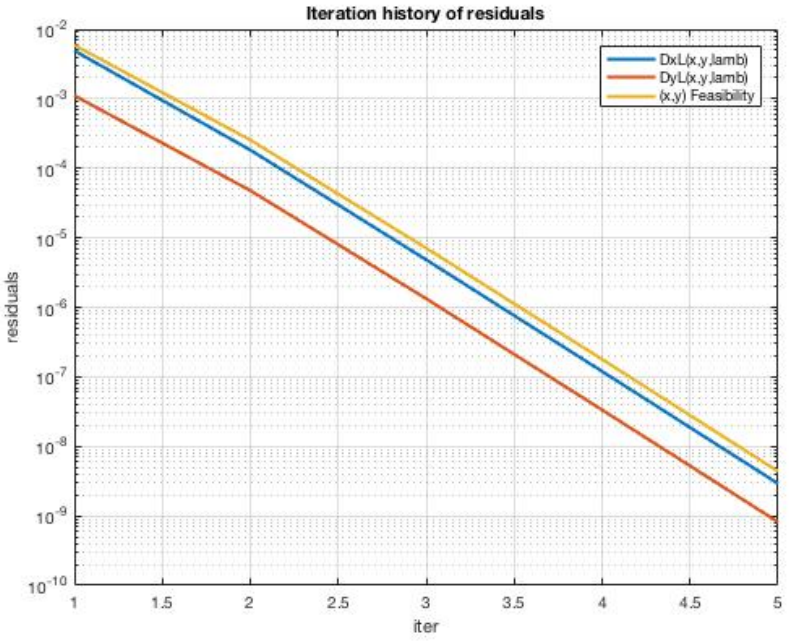

Figure 5: Iteration history residuals for my code

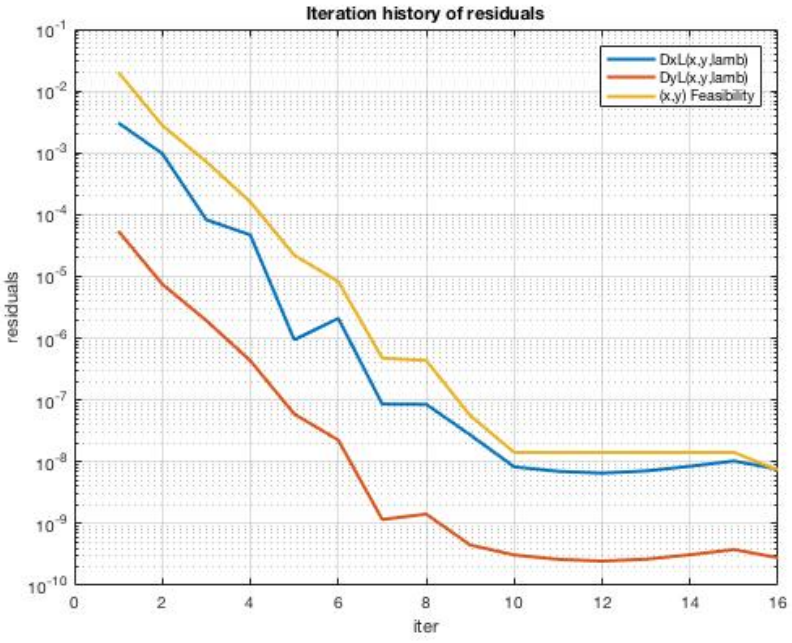

Figure 6: Iteration history residuals for instructor's code

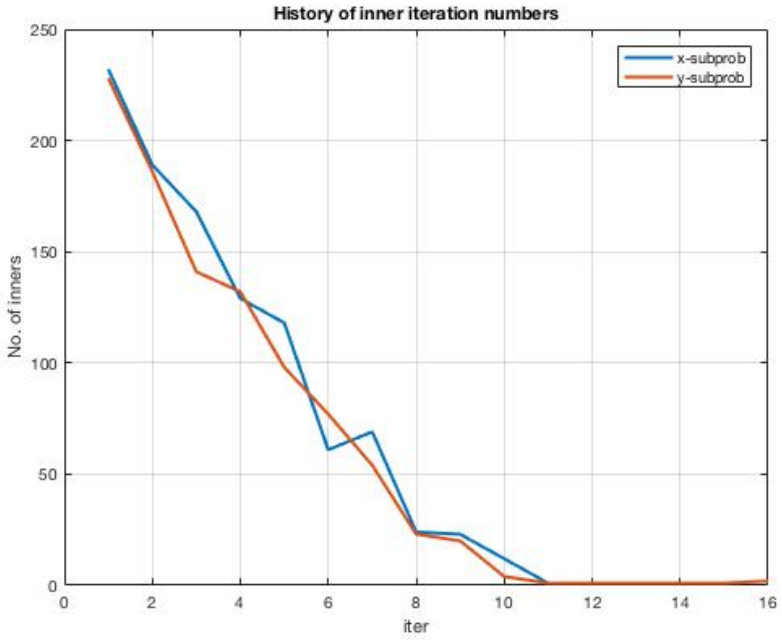

Figure 7: Historty Inner iteration Numbers for instructor's code

2.2 Screen Printout ($s = 1, n = 3600$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 3600
s = 1

----- solver: my_qcqp_admm  n = 3600  s = 1.00 -----
iter  1: rres = [ 4.92e-03  1.11e-03  5.92e-03]
iter  2: rres = [ 1.83e-04  4.79e-05  2.56e-04]
iter  3: rres = [ 4.84e-06  1.33e-06  7.11e-06]
iter  4: rres = [ 1.20e-07  3.35e-08  1.79e-07]
iter  5: rres = [ 2.91e-09  8.17e-10  4.36e-09]
Convergence = 1 at iter 5
Elapsed time is 0.455333 seconds.
Stationarity: [2.05e-09 4.68e-11 4.36e-09]
----- solver: my_qcqp_admm  n = 3600  s = 1.00 -----


----- solver: yz_qcqp_admm  n = 3600  s = 1.00 -----
iter   1: rres = (3.06e-03 5.42e-05 2.01e-02)  time: 4.19e-02
iter  10: rres = (8.29e-09 3.11e-10 1.42e-08)  time: 1.35e-01
iter  16: rres = (7.57e-09 2.80e-10 7.35e-09)  time: 6.21e-03
Convergence = 1 at iter 16
Elapsed time is 0.184708 seconds.
Stationarity: [7.57e-09 7.64e-09 7.35e-09]
----- solver: yz_qcqp_admm  n = 3600  s = 1.00 -----


--------------------------------------
(x,y)-deviations: [1.74e-08 1.95e-08]
objective values:
                -87.318921452723515
                -87.318921453071155
Elapsed times:
                0.455391
                0.185011
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:18:57
--------------------------------------

fx >>
```

Figure 8: Historty Inner iteration Numbers for instructor's code

3 Output Figures and Screen Printout for $s = 10, n = 3600$.

3.1 Output Figures ($s = 10, n = 3600$).

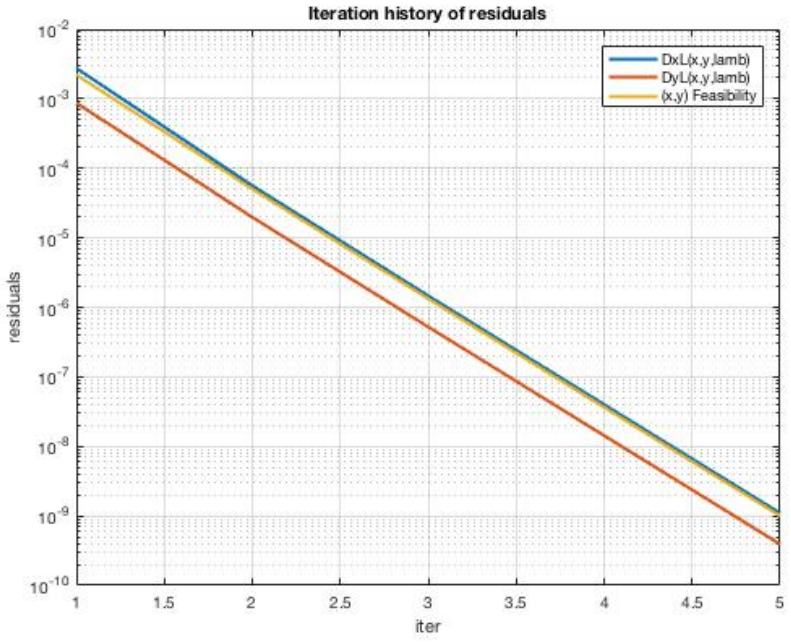

Figure 9: Iteration history residuals for my code

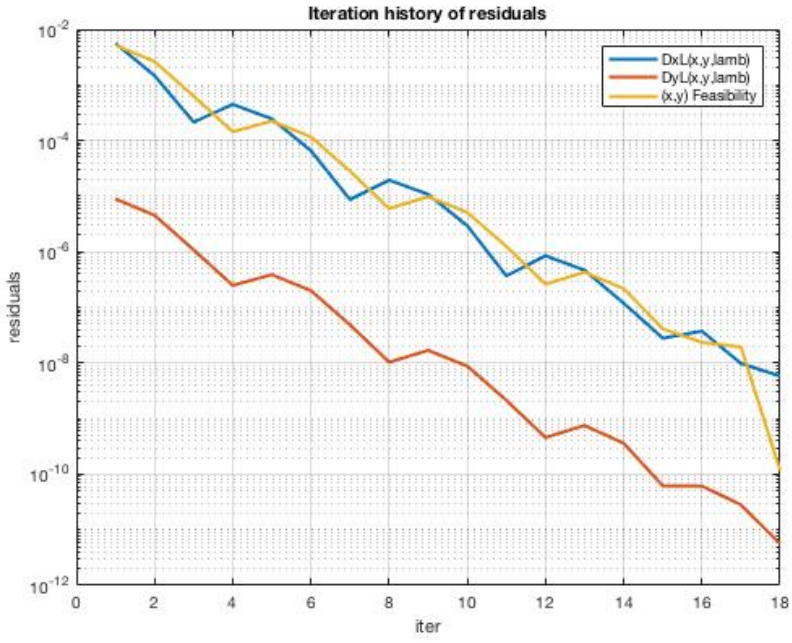

Figure 10: Iteration history residuals for instructor's code

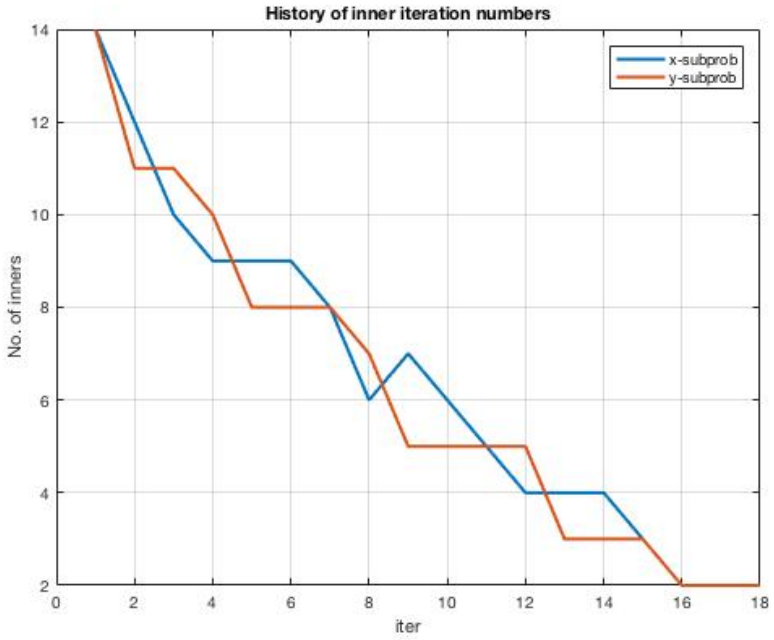

Figure 11: Historty Inner iteration Numbers for instructor's code

3.2 Screen Printout ($s = 10, n = 3600$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 3600
s = 10

----- solver: my_qcqp_admm  n = 3600  s = 10.00 -----
iter  1: rres = [ 2.75e-03  8.68e-04  2.21e-03]
iter  2: rres = [ 5.61e-05  1.98e-05  5.04e-05]
iter  3: rres = [ 1.46e-06  5.23e-07  1.33e-06]
iter  4: rres = [ 3.99e-08  1.43e-08  3.64e-08]
iter  5: rres = [ 1.09e-09  3.92e-10  9.99e-10]
Convergence = 1 at iter 5
Elapsed time is 0.156061 seconds.
Stationarity: [6.81e-10 2.10e-11 9.99e-10]
----- solver: my_qcqp_admm  n = 3600  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 3600  s = 10.00 -----
iter   1: rres = (5.57e-03 8.90e-06 5.16e-03)  time: 5.50e-03
iter  10: rres = (2.92e-06 8.75e-09 5.08e-06)  time: 3.19e-02
iter  18: rres = (5.79e-09 5.62e-12 1.17e-10)  time: 1.37e-02
Convergence = 1 at iter 18
Elapsed time is 0.052398 seconds.
Stationarity: [5.79e-09 1.48e-09 1.17e-10]
----- solver: yz_qcqp_admm  n = 3600  s = 10.00 -----


---------------------------------------
(x,y)-deviations: [3.18e-09 2.29e-09]
objective values:
                -556.642466928909471
                -556.642466929893089
Elapsed times:
                0.156118
                0.053126
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:21:03
---------------------------------------

fx >>
```

Figure 12: Historty Inner iteration Numbers for instructor's code

4 Output Figures and Screen Printout for $s = 0.1, n = 10000$.

4.1 Output Figures ($s = 0.1, n = 10000$).

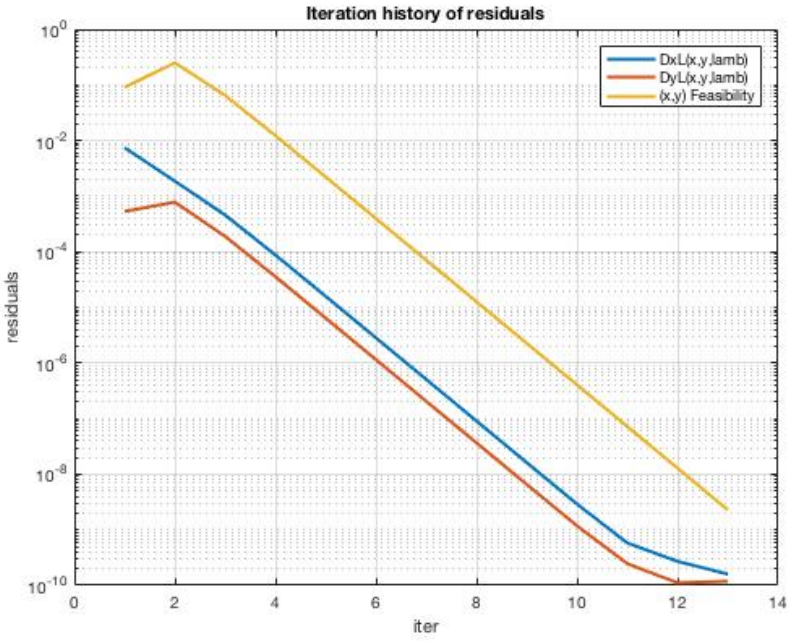

Figure 13: Iteration history residuals for my code

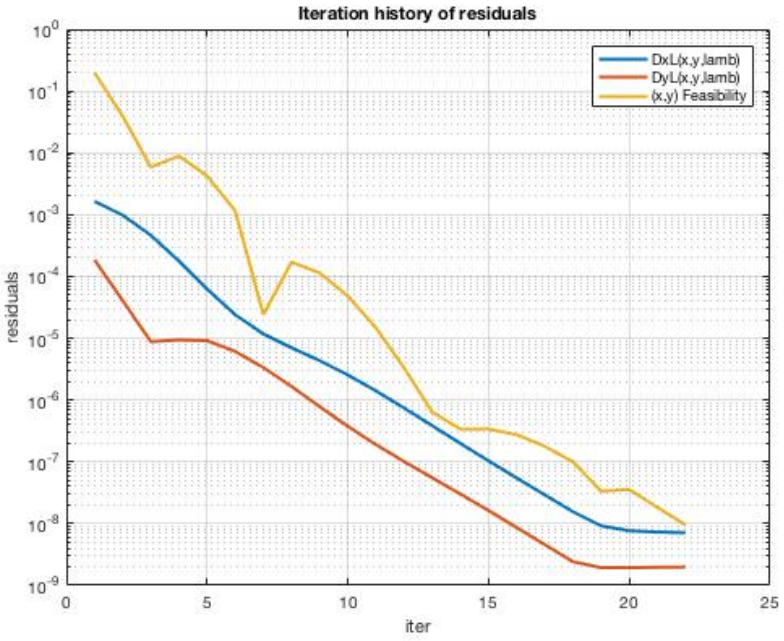

Figure 14: Iteration history residuals for instructor's code

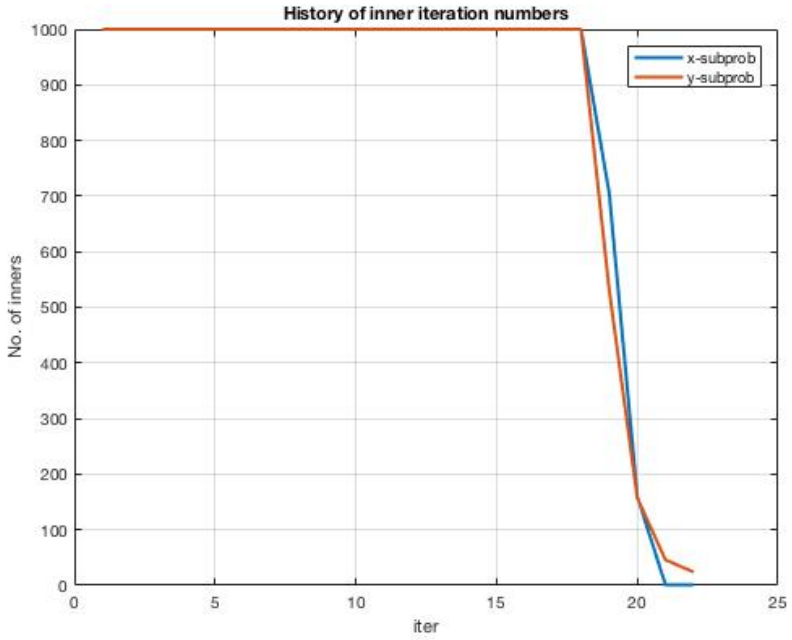

Figure 15: Historty Inner iteration Numbers for instructor's code

4.2 Screen Printout ($s = 0.1, n = 10000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 10000
s = 0.1

----- solver: my_qcqp_admm  n = 10000  s = 0.10 -----
iter  1: rres = [ 7.39e-03  5.30e-04  9.06e-02]
iter  2: rres = [ 1.86e-03  7.81e-04  2.49e-01]
iter  3: rres = [ 4.56e-04  1.89e-04  6.45e-02]
iter  4: rres = [ 8.73e-05  3.55e-05  1.22e-02]
iter  5: rres = [ 1.58e-05  6.40e-06  2.21e-03]
iter  6: rres = [ 2.83e-06  1.15e-06  3.95e-04]
iter  7: rres = [ 5.06e-07  2.05e-07  7.06e-05]
iter  8: rres = [ 9.03e-08  3.66e-08  1.26e-05]
iter  9: rres = [ 1.61e-08  6.54e-09  2.26e-06]
iter 10: rres = [ 2.90e-09  1.18e-09  4.03e-07]
iter 11: rres = [ 5.79e-10  2.46e-10  7.20e-08]
iter 12: rres = [ 2.71e-10  1.11e-10  1.29e-08]
iter 13: rres = [ 1.60e-10  1.19e-10  2.27e-09]
Convergence = 1 at iter 13
Elapsed time is 138.161181 seconds.
Stationarity: [1.59e-10 1.18e-10 2.27e-09]
----- solver: my_qcqp_admm  n = 10000  s = 0.10 -----


----- solver: yz_qcqp_admm  n = 10000  s = 0.10 -----
iter   1: rres = (1.64e-03 1.85e-04 1.98e-01)  time: 3.85e-01
iter  10: rres = (2.54e-06 3.75e-07 4.81e-05)  time: 3.32e+00
iter  20: rres = (7.66e-09 1.94e-09 3.58e-08)  time: 3.24e+00
iter  22: rres = (7.12e-09 1.98e-09 9.51e-09)  time: 2.38e-02
Convergence = 1 at iter 22
Elapsed time is 6.966403 seconds.
Stationarity: [7.12e-09 7.17e-09 9.51e-09]
----- solver: yz_qcqp_admm  n = 10000  s = 0.10 -----


---------------------------------------
(x,y)-deviations: [6.50e-07 6.78e-07]
objective values:
               -64.955084497904181
               -64.955084497857939
Elapsed times:
               138.161242
               6.966471
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 12:04:15
---------------------------------------

fx >>
```

Figure 16: Historty Inner iteration Numbers for instructor's code

5 Output Figures and Screen Printout for $s = 1, n = 10000$.

5.1 Output Figures ($s = 1, n = 10000$).

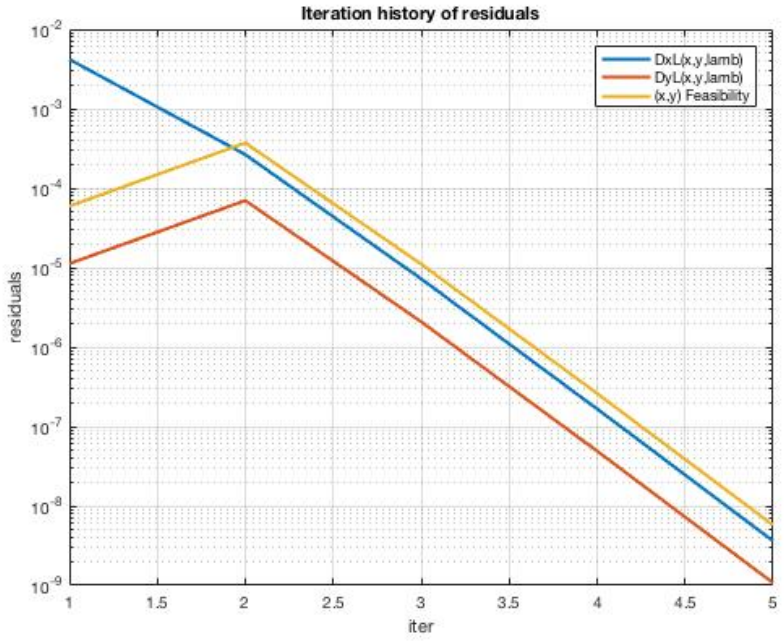

Figure 17: Iteration history residuals for my code

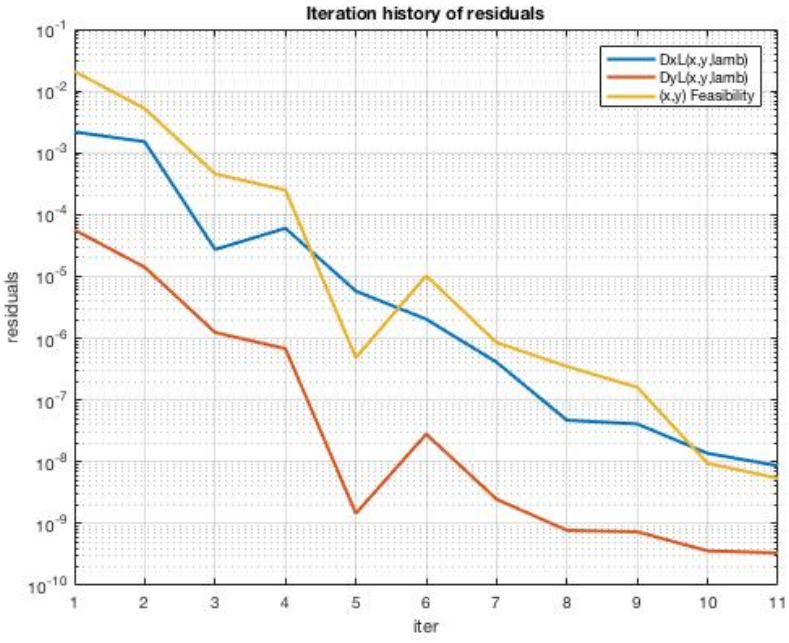

Figure 18: Iteration history residuals for instructor's code

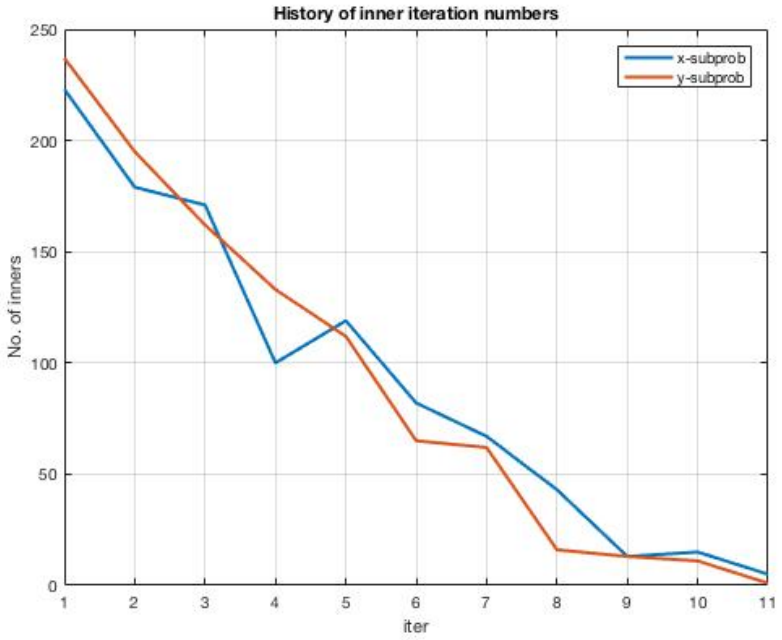

Figure 19: Historty Inner iteration Numbers for instructor's code

5.2 Screen Printout ($s = 1, n = 10000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 10000
s = 1

----- solver: my_qcqp_admm  n = 10000  s = 1.00 -----
iter  1: rres = [ 4.18e-03  1.12e-05  5.93e-05]
iter  2: rres = [ 2.64e-04  6.98e-05  3.71e-04]
iter  3: rres = [ 7.21e-06  2.08e-06  1.11e-05]
iter  4: rres = [ 1.66e-07  4.90e-08  2.60e-07]
iter  5: rres = [ 3.62e-09  1.08e-09  5.73e-09]
Convergence = 1 at iter 5
Elapsed time is 1.032904 seconds.
Stationarity: [2.49e-09 6.11e-11 5.73e-09]
----- solver: my_qcqp_admm  n = 10000  s = 1.00 -----

----- solver: yz_qcqp_admm  n = 10000  s = 1.00 -----
iter   1: rres = (2.18e-03 5.66e-05 2.09e-02)  time: 1.02e-01
iter  10: rres = (1.37e-08 3.62e-10 9.42e-09)  time: 3.13e-01
iter  11: rres = (8.64e-09 3.35e-10 5.42e-09)  time: 6.62e-03
Convergence = 1 at iter 11
Elapsed time is 0.423283 seconds.
Stationarity: [8.64e-09 9.10e-09 5.42e-09]
----- solver: yz_qcqp_admm  n = 10000  s = 1.00 -----


---------------------------------------
(x,y)-deviations: [2.14e-08 1.62e-08]
objective values:
                -87.430505983405226
                -87.430505983372498
Elapsed times:
                1.032962
                0.423615
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:36:34
---------------------------------------

fx >>
```

Figure 20: Historty Inner iteration Numbers for instructor's code

6 Output Figures and Screen Printout for $s = 10, n = 10000$.

6.1 Output Figures ($s = 10, n = 10000$).

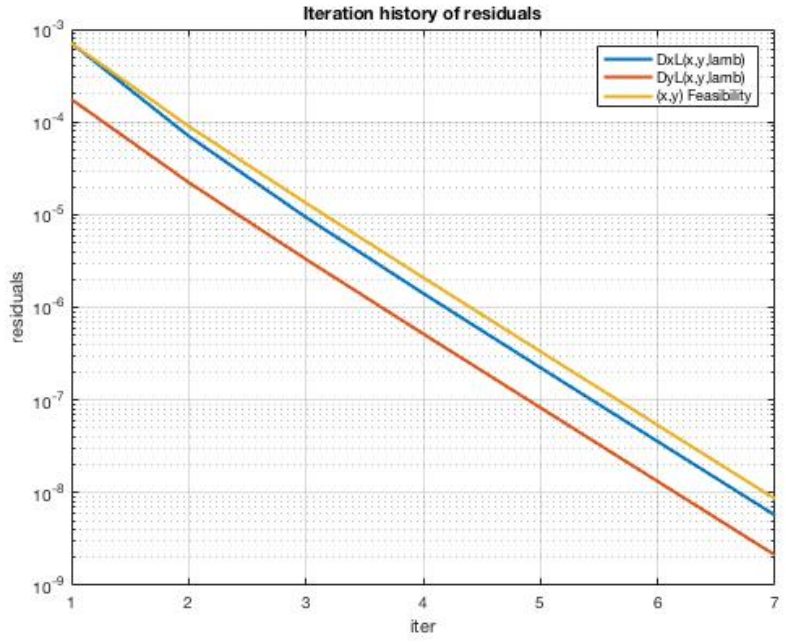

Figure 21: Iteration history residuals for my code

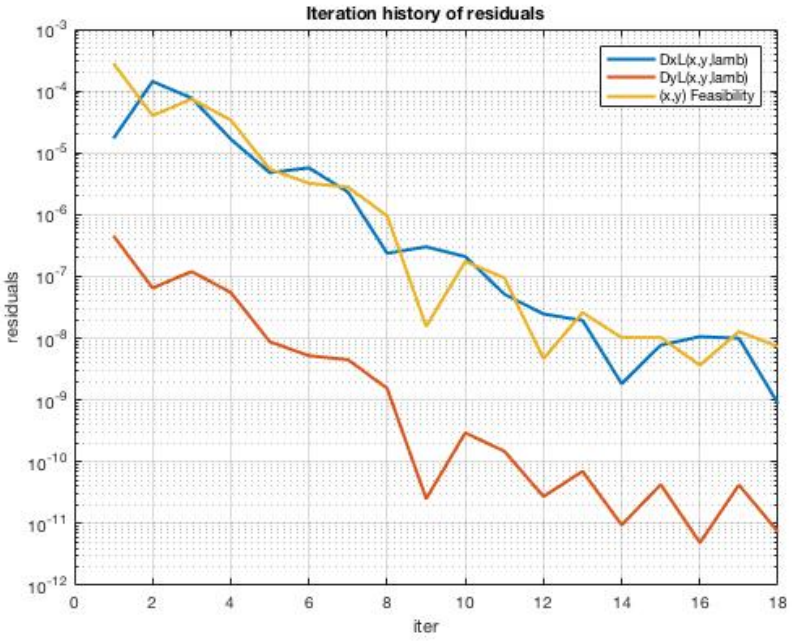

Figure 22: Iteration history residuals for instructor's code

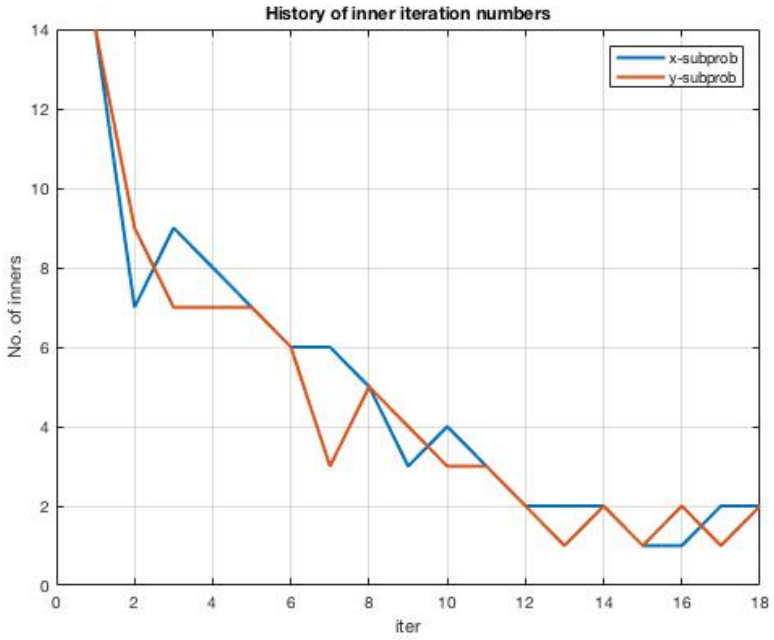

Figure 23: Historty Inner iteration Numbers for instructor's code

6.2 Screen Printout ($s = 10, n = 10000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 10000
s = 10

----- solver: my_qcqp_admm  n = 10000  s = 10.00 -----
iter  1: rres = [ 7.09e-04  1.75e-04  7.09e-04]
iter  2: rres = [ 7.04e-05  2.23e-05  8.99e-05]
iter  3: rres = [ 9.37e-06  3.30e-06  1.33e-05]
iter  4: rres = [ 1.41e-06  5.18e-07  2.09e-06]
iter  5: rres = [ 2.23e-07  8.25e-08  3.34e-07]
iter  6: rres = [ 3.56e-08  1.32e-08  5.34e-08]
iter  7: rres = [ 5.71e-09  2.12e-09  8.58e-09]
Convergence = 1 at iter 7
Elapsed time is 0.504960 seconds.
Stationarity: [2.28e-09 1.31e-09 8.58e-09]
----- solver: my_qcqp_admm  n = 10000  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 10000  s = 10.00 -----
iter   1: rres = (1.71e-05 4.56e-07 2.81e-04)  time: 1.58e-02
iter  10: rres = (2.10e-07 2.94e-10 1.74e-07)  time: 5.17e-02
iter  18: rres = (8.72e-10 7.37e-12 7.30e-09)  time: 2.13e-02
Convergence = 1 at iter 18
Elapsed time is 0.090219 seconds.
Stationarity: [8.72e-10 1.93e-09 7.30e-09]
----- solver: yz_qcqp_admm  n = 10000  s = 10.00 -----


--------------------------------------
(x,y)-deviations: [9.10e-09 6.78e-09]
objective values:
                -555.652409271903025
                -555.652409271631427
Elapsed times:
                0.505021
                0.090280
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:45:20
--------------------------------------

fx >>
```

Figure 24: Historty Inner iteration Numbers for instructor's code

7 Output Figures and Screen Printout for $s = 1, n = 40000$.

7.1 Output Figures ($s = 1, n = 40000$).

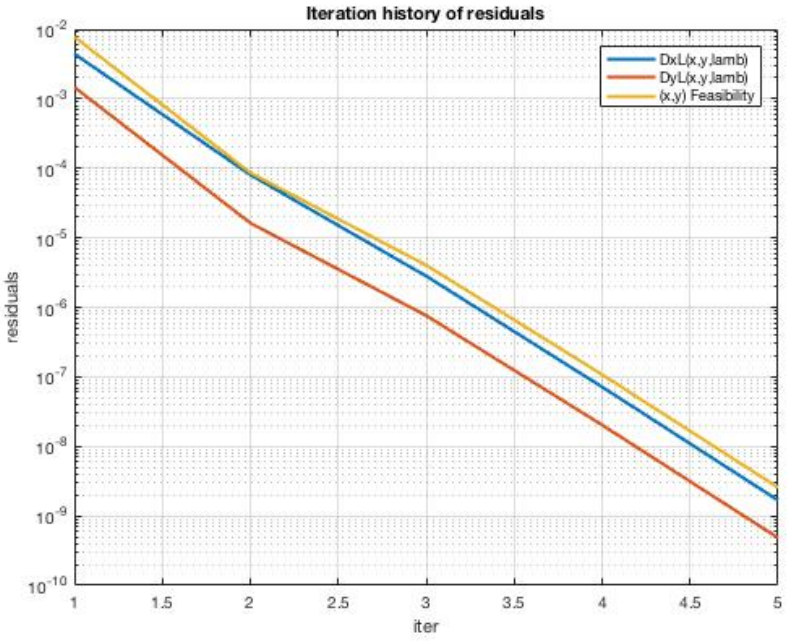

Figure 25: Iteration history residuals for my code

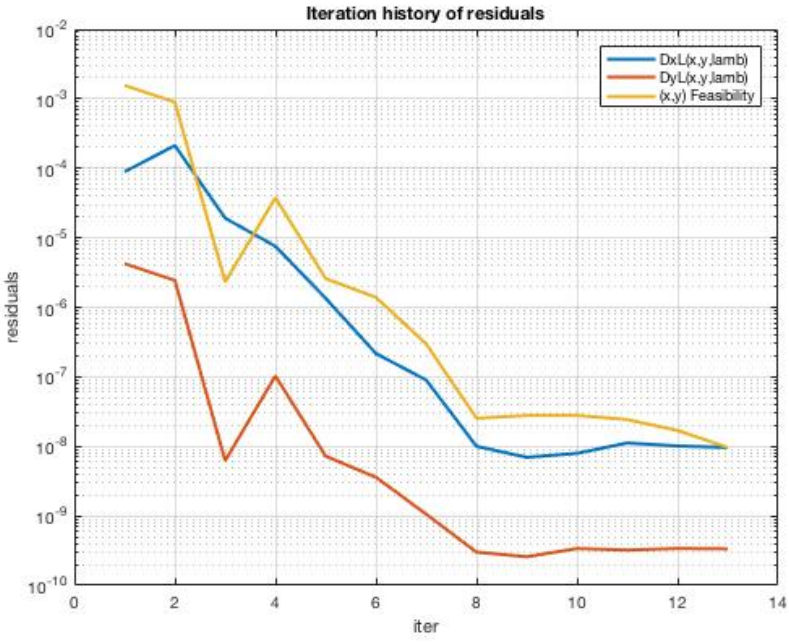

Figure 26: Iteration history residuals for instructor's code

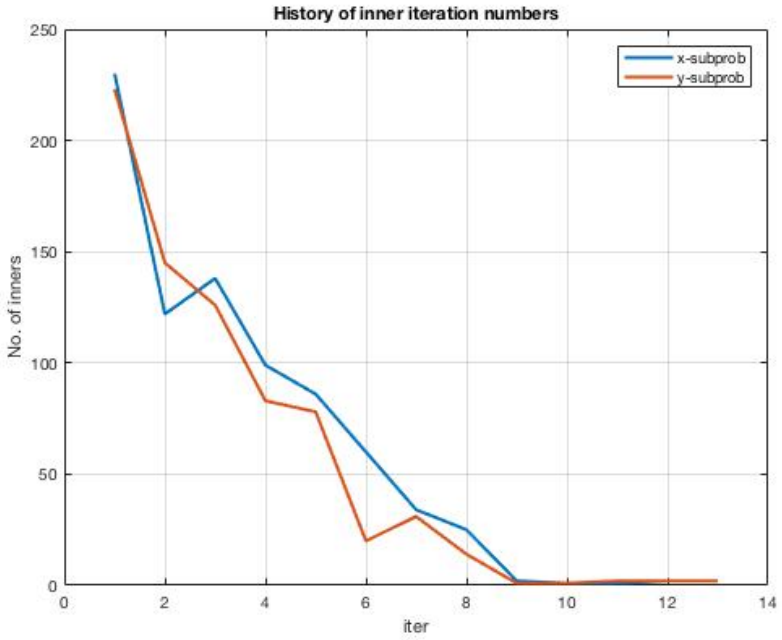

Figure 27: Historty Inner iteration Numbers for instructor's code

7.2 Screen Printout ($s = 1, n = 40000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 40000
s = 1

----- solver: my_qcqp_admm  n = 40000  s = 1.00 -----
iter  1: rres = [ 4.42e-03  1.46e-03  7.77e-03]
iter  2: rres = [ 8.06e-05  1.63e-05  8.62e-05]
iter  3: rres = [ 2.82e-06  7.61e-07  4.03e-06]
iter  4: rres = [ 7.15e-08  2.03e-08  1.08e-07]
iter  5: rres = [ 1.67e-09  4.83e-10  2.56e-09]
Convergence = 1 at iter 5
Elapsed time is 3.922724 seconds.
Stationarity: [1.17e-09 2.54e-11 2.56e-09]
----- solver: my_qcqp_admm  n = 40000  s = 1.00 -----


----- solver: yz_qcqp_admm  n = 40000  s = 1.00 -----
iter   1: rres = (8.93e-05 4.25e-06 1.56e-03)  time: 3.62e-01
iter  10: rres = (7.95e-09 3.39e-10 2.79e-08)  time: 7.66e-01
iter  13: rres = (9.64e-09 3.35e-10 9.66e-09)  time: 2.63e-02
Convergence = 1 at iter 13
Elapsed time is 1.156051 seconds.
Stationarity: [9.64e-09 9.08e-09 9.66e-09]
----- solver: yz_qcqp_admm  n = 40000  s = 1.00 -----


---------------------------------------
(x,y)-deviations: [1.88e-08 1.44e-08]
objective values:
                -87.178536599954171
                -87.178536599927412
Elapsed times:
                3.922799
                1.156108
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:47:14
---------------------------------------

fx >>
```

Figure 28: Historty Inner iteration Numbers for instructor's code

8 Output Figures and Screen Printout for $s = 10, n = 40000$.

8.1 Output Figures ($s = 10, n = 40000$).

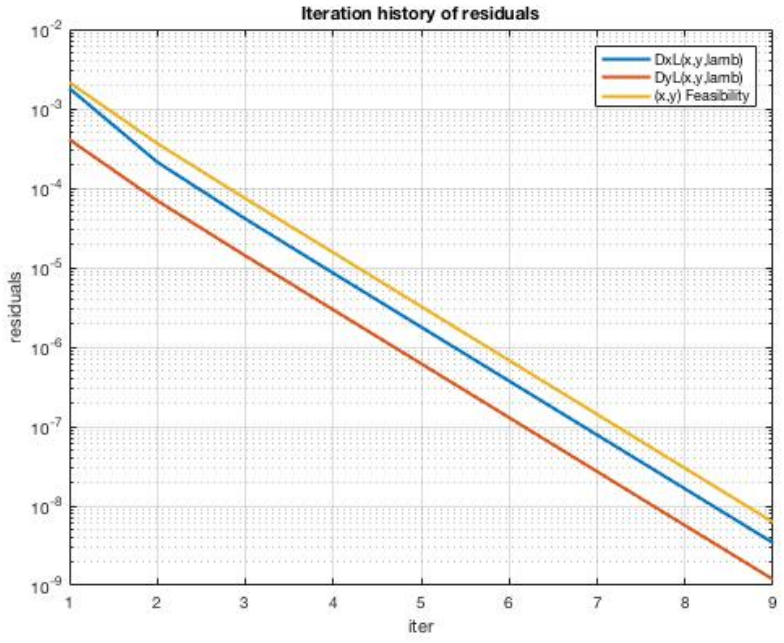

Figure 29: Iteration history residuals for my code

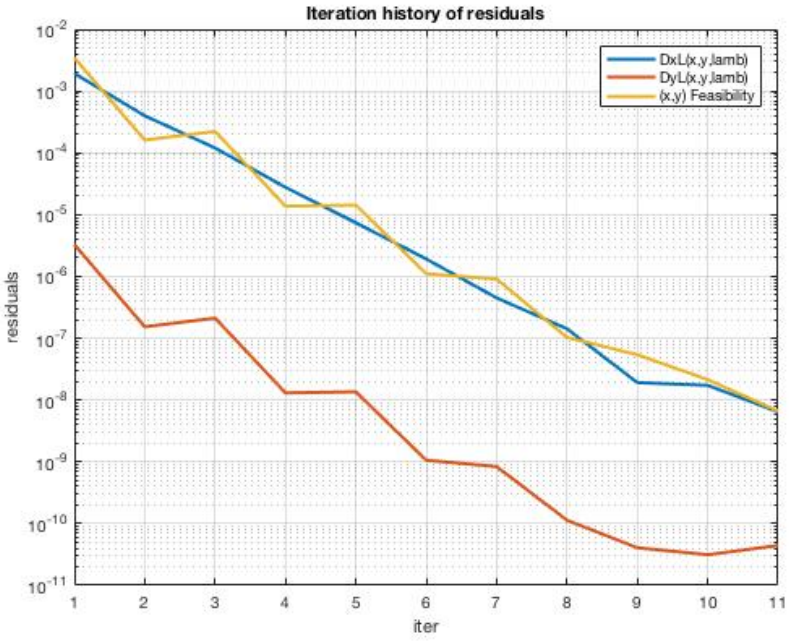

Figure 30: Iteration history residuals for instructor's code

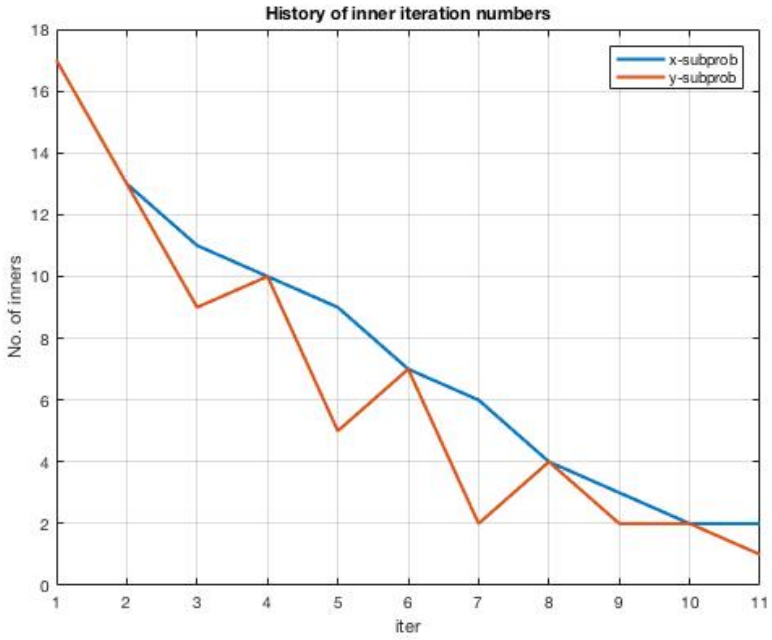

Figure 31: Historty Inner iteration Numbers for instructor's code

8.2 Screen Printout ($s = 10, n = 40000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 40000
s = 10

----- solver: my_qcqp_admm  n = 40000  s = 10.00 -----
iter  1: rres = [ 1.80e-03  4.09e-04  2.14e-03]
iter  2: rres = [ 2.13e-04  6.94e-05  3.64e-04]
iter  3: rres = [ 4.11e-05  1.41e-05  7.41e-05]
iter  4: rres = [ 8.53e-06  2.95e-06  1.55e-05]
iter  5: rres = [ 1.78e-06  6.17e-07  3.24e-06]
iter  6: rres = [ 3.74e-07  1.29e-07  6.78e-07]
iter  7: rres = [ 7.83e-08  2.71e-08  1.42e-07]
iter  8: rres = [ 1.64e-08  5.67e-09  2.98e-08]
iter  9: rres = [ 3.44e-09  1.19e-09  6.24e-09]
Convergence = 1 at iter 9
Elapsed time is 2.247294 seconds.
Stationarity: [1.51e-09 7.35e-10 6.24e-09]
----- solver: my_qcqp_admm  n = 40000  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 40000  s = 10.00 -----
iter   1: rres = (1.93e-03 3.28e-06 3.45e-03)  time: 3.74e-02
iter  10: rres = (1.73e-08 3.14e-11 2.14e-08)  time: 1.15e-01
iter  11: rres = (6.44e-09 4.42e-11 6.60e-09)  time: 9.20e-03
Convergence = 1 at iter 11
Elapsed time is 0.163469 seconds.
Stationarity: [6.44e-09 1.16e-08 6.60e-09]
----- solver: yz_qcqp_admm  n = 40000  s = 10.00 -----


---------------------------------------
(x,y)-deviations: [5.67e-09 8.42e-09]
objective values:
                -564.570000624327349
                -564.570000631850007
Elapsed times:
                2.247353
                0.163593
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:48:52
---------------------------------------

fx >>
```

Figure 32: Historty Inner iteration Numbers for instructor's code

9 Output Figures and Screen Printout for $s = 1, n = 90000$.

9.1 Output Figures ($s = 1, n = 90000$).

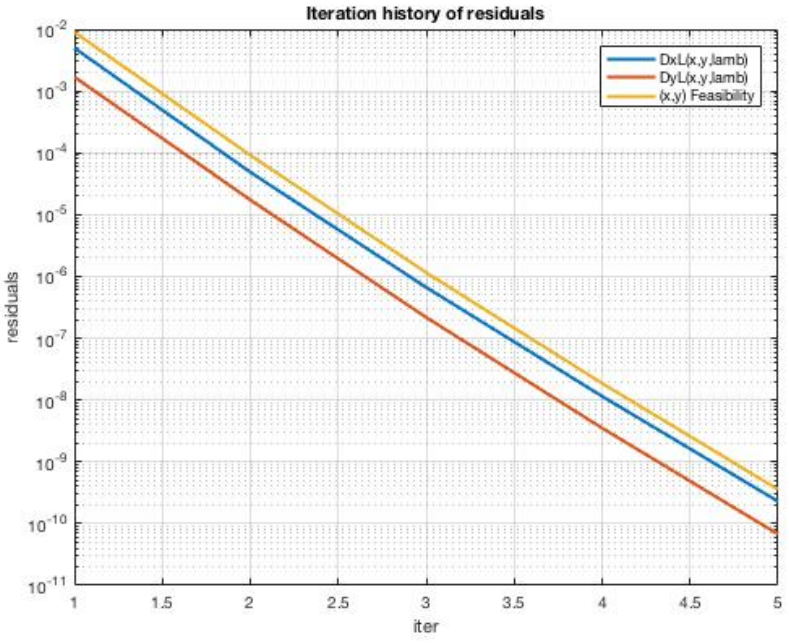

Figure 33: Iteration history residuals for my code

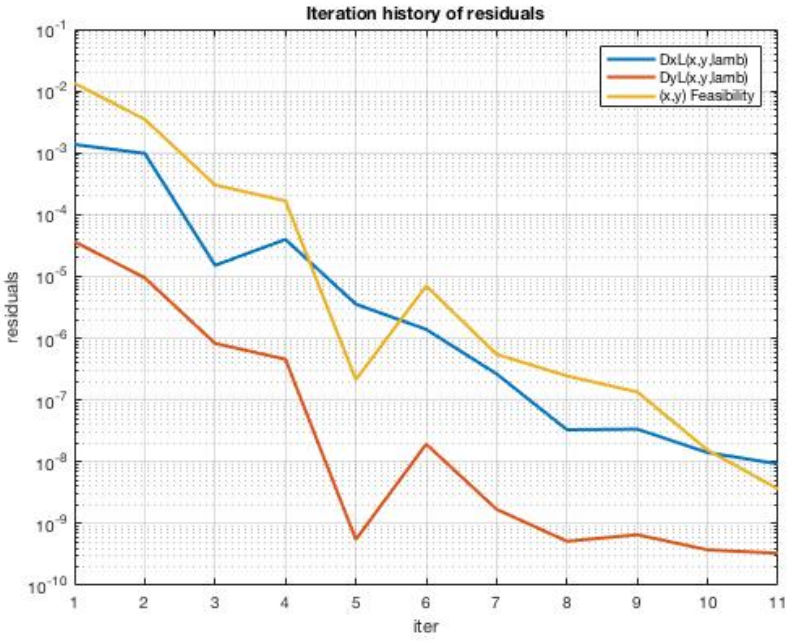

Figure 34: Iteration history residuals for instructor's code

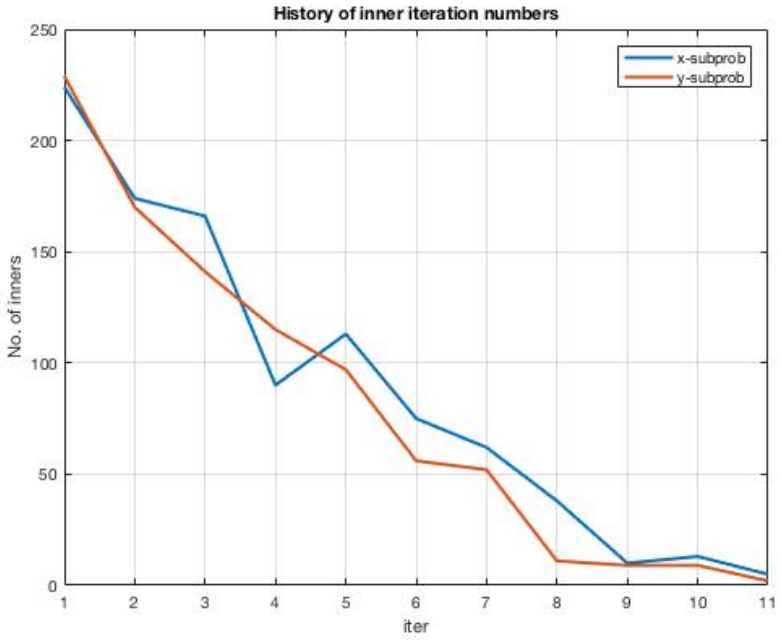

Figure 35: Historty Inner iteration Numbers for instructor's code

9.2 Screen Printout ($s = 1, n = 90000$).

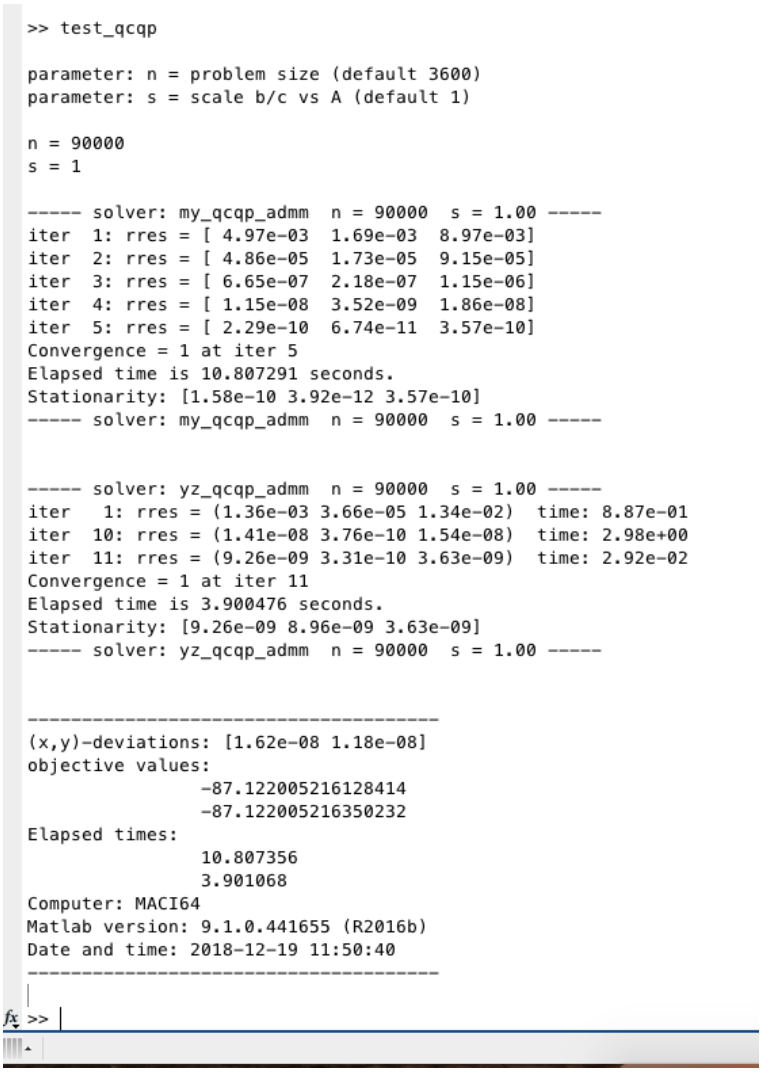

Figure 36: Historty Inner iteration Numbers for instructor's code

10 Output Figures and Screen Printout for $s = 10, n = 90000$.

10.1 Output Figures ($s = 10, n = 90000$).

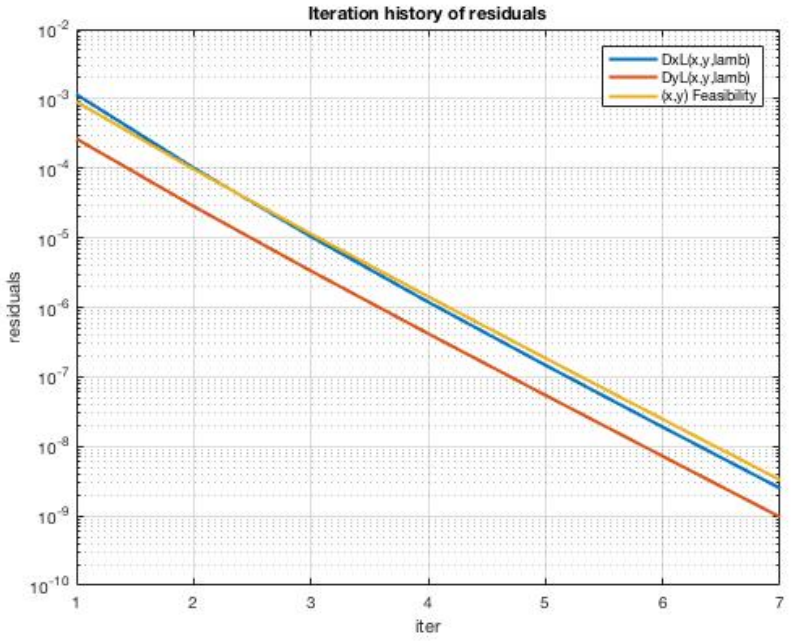

Figure 37: Iteration history residuals for my code

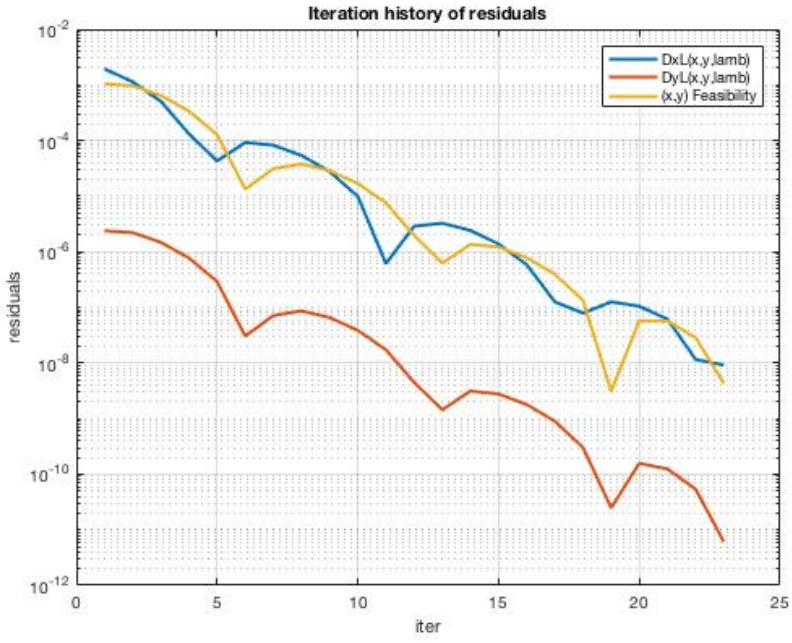

Figure 38: Iteration history residuals for instructor's code

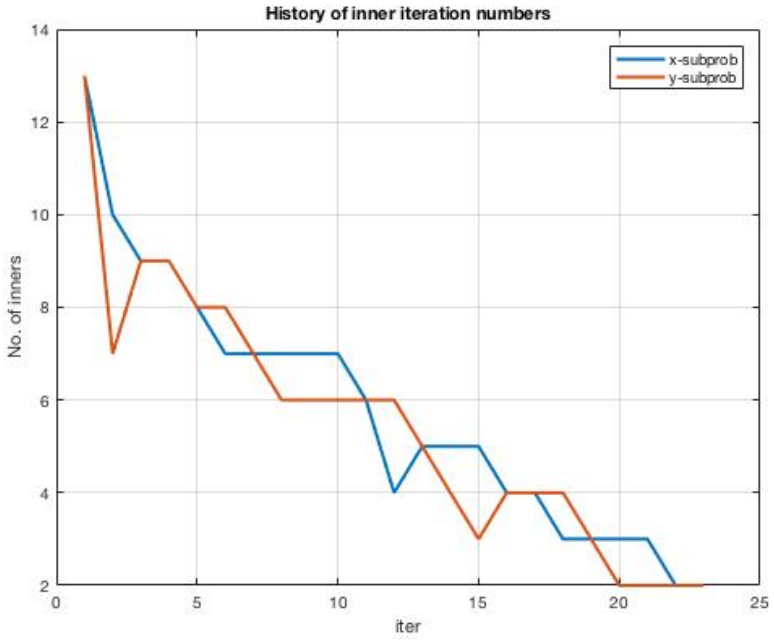

Figure 39: Historty Inner iteration Numbers for instructor's code

10.2 Screen Printout ($s = 10, n = 90000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 90000
s = 10

----- solver: my_qcqp_admm  n = 90000  s = 10.00 -----
iter  1: rres = [ 1.15e-03  2.66e-04  9.08e-04]
iter  2: rres = [ 1.01e-04  2.84e-05  9.67e-05]
iter  3: rres = [ 1.04e-05  3.34e-06  1.14e-05]
iter  4: rres = [ 1.19e-06  4.18e-07  1.43e-06]
iter  5: rres = [ 1.47e-07  5.44e-08  1.85e-07]
iter  6: rres = [ 1.89e-08  7.20e-09  2.46e-08]
iter  7: rres = [ 2.50e-09  9.63e-10  3.28e-09]
Convergence = 1 at iter 7
Elapsed time is 4.215811 seconds.
Stationarity: [9.37e-10 5.95e-10 3.28e-09]
----- solver: my_qcqp_admm  n = 90000  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 90000  s = 10.00 -----
iter   1: rres = (1.94e-03 2.38e-06 1.04e-03)  time: 6.13e-02
iter  10: rres = (9.87e-06 3.85e-08 1.68e-05)  time: 2.67e-01
iter  20: rres = (1.05e-07 1.56e-10 5.70e-08)  time: 1.90e-01
iter  23: rres = (9.17e-09 6.14e-12 4.32e-09)  time: 4.81e-02
Convergence = 1 at iter 23
Elapsed time is 0.570156 seconds.
Stationarity: [9.17e-09 1.61e-09 4.32e-09]
----- solver: yz_qcqp_admm  n = 90000  s = 10.00 -----


---------------------------------------
(x,y)-deviations: [5.02e-09 6.12e-09]
objective values:
                -547.710265432642473
                -547.710265432317783
Elapsed times:
                4.215874
                0.570368
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:52:16
---------------------------------------

fx >>
```

Figure 40: Historty Inner iteration Numbers for instructor's code

11 Output Figures and Screen Printout for $s = 1, n = 250000$.

11.1 Output Figures ($s = 1, n = 250000$).

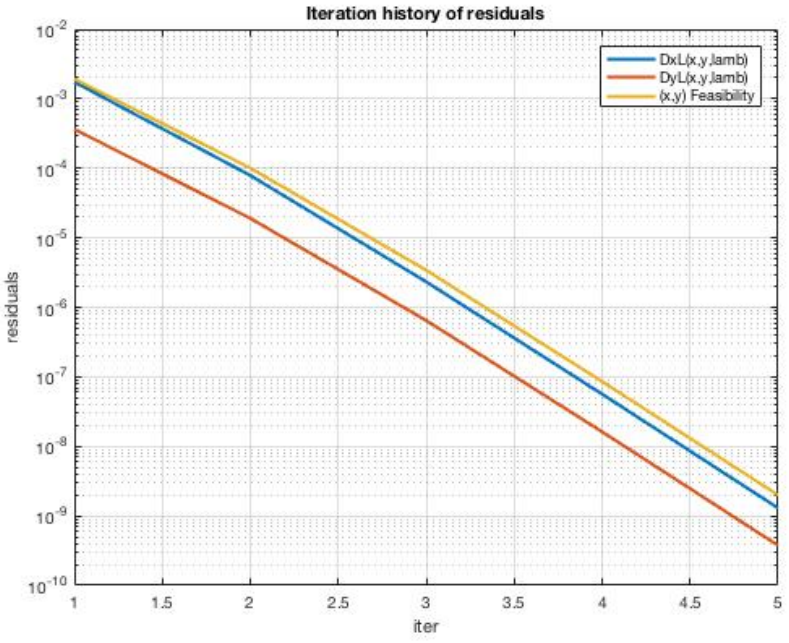

Figure 41: Iteration history residuals for my code

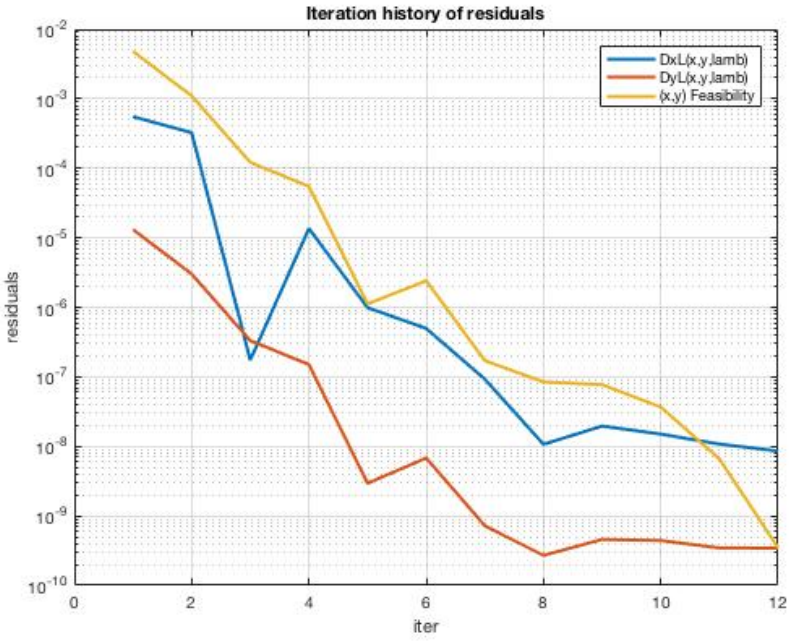

Figure 42: Iteration history residuals for instructor's code

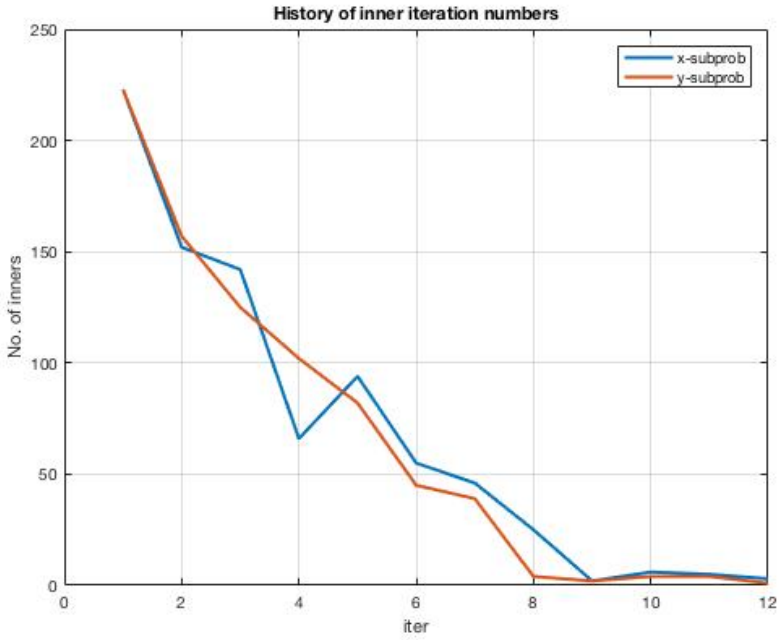

Figure 43: Historty Inner iteration Numbers for instructor's code

11.2 Screen Printout ($s = 1, n = 250000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 250000
s = 1

----- solver: my_qcqp_admm  n = 250000  s = 1.00 -----
iter  1: rres = [ 1.74e-03  3.65e-04  1.93e-03]
iter  2: rres = [ 7.90e-05  1.91e-05  1.01e-04]
iter  3: rres = [ 2.33e-06  6.46e-07  3.42e-06]
iter  4: rres = [ 5.65e-08  1.62e-08  8.57e-08]
iter  5: rres = [ 1.30e-09  3.75e-10  1.99e-09]
Convergence = 1 at iter 5
Elapsed time is 33.376607 seconds.
Stationarity: [9.01e-10 1.99e-11 1.99e-09]
----- solver: my_qcqp_admm  n = 250000  s = 1.00 -----


----- solver: yz_qcqp_admm  n = 250000  s = 1.00 -----
iter   1: rres = (5.53e-04 1.32e-05 4.81e-03)  time: 2.71e+00
iter  10: rres = (1.50e-08 4.42e-10 3.68e-08)  time: 6.68e+00
iter  12: rres = (8.56e-09 3.44e-10 3.48e-10)  time: 1.31e-01
Convergence = 1 at iter 12
Elapsed time is 9.532423 seconds.
Stationarity: [8.56e-09 9.30e-09 3.48e-10]
----- solver: yz_qcqp_admm  n = 250000  s = 1.00 -----


---------------------------------------
(x,y)-deviations: [9.71e-09 1.14e-08]
objective values:
                -87.066459809568869
                -87.066459809527231
Elapsed times:
                33.376833
                9.532526
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:54:44
---------------------------------------

fx >>
```

Figure 44: Historty Inner iteration Numbers for instructor's code

12 Output Figures and Screen Printout for $s = 10, n = 250000$.

12.1 Output Figures ($s = 10, n = 250000$).

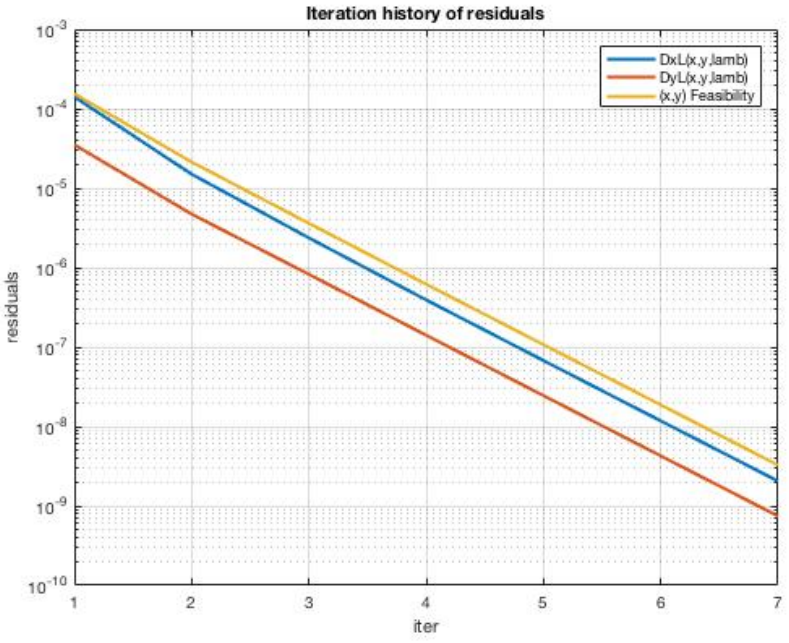

Figure 45: Iteration history residuals for my code

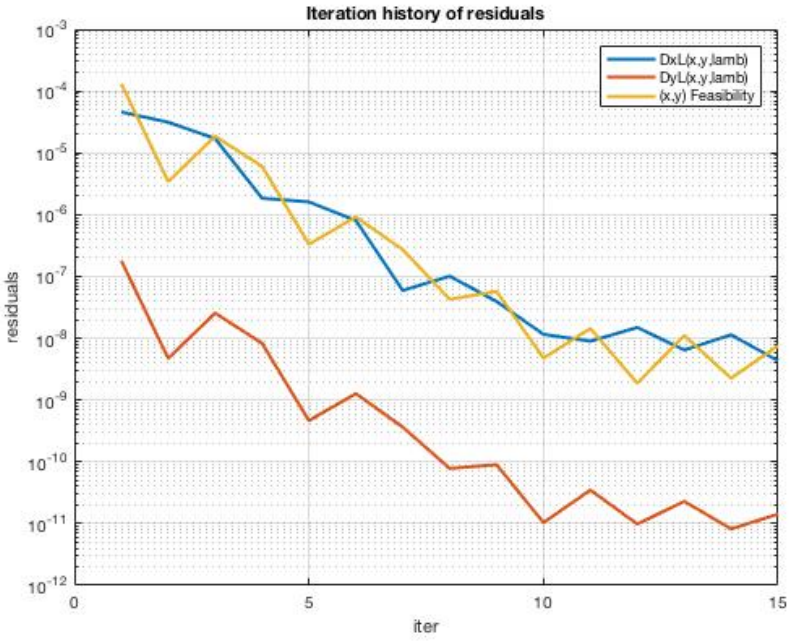

Figure 46: Iteration history residuals for instructor's code

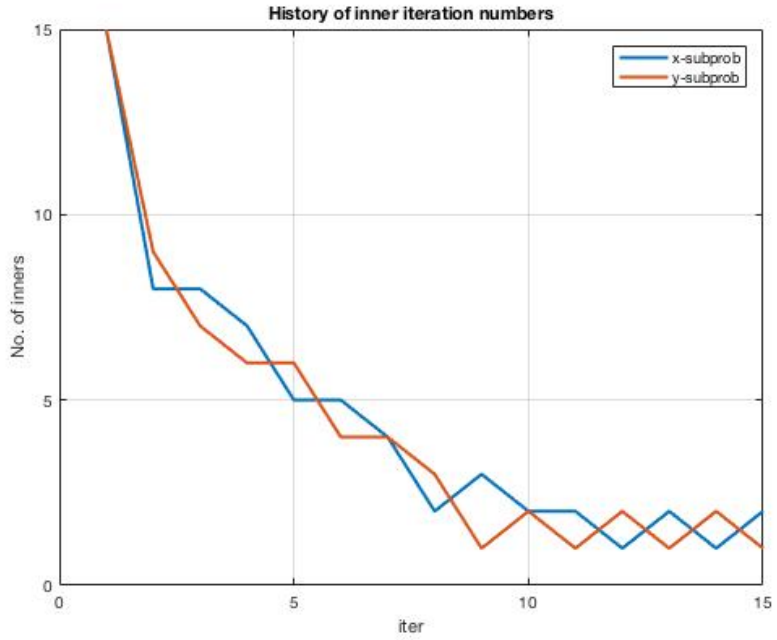

Figure 47: Historty Inner iteration Numbers for instructor's code

12.2 Screen Printout ($s = 10, n = 250000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 250000
s = 10

----- solver: my_qcqp_admm  n = 250000  s = 10.00 -----
iter  1: rres = [ 1.41e-04  3.52e-05  1.54e-04]
iter  2: rres = [ 1.50e-05  4.71e-06  2.13e-05]
iter  3: rres = [ 2.36e-06  8.23e-07  3.61e-06]
iter  4: rres = [ 3.92e-07  1.41e-07  6.17e-07]
iter  5: rres = [ 6.76e-08  2.45e-08  1.07e-07]
iter  6: rres = [ 1.18e-08  4.27e-09  1.87e-08]
iter  7: rres = [ 2.05e-09  7.45e-10  3.26e-09]
Convergence = 1 at iter 7
Elapsed time is 14.501933 seconds.
Stationarity: [8.47e-10 4.60e-10 3.26e-09]
----- solver: my_qcqp_admm  n = 250000  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 250000  s = 10.00 -----
iter   1: rres = (4.58e-05 1.81e-07 1.32e-04)  time: 2.09e-01
iter  10: rres = (1.16e-08 1.04e-11 4.78e-09)  time: 6.76e-01
iter  15: rres = (4.31e-09 1.43e-11 7.60e-09)  time: 1.93e-01
Convergence = 1 at iter 15
Elapsed time is 1.087892 seconds.
Stationarity: [4.31e-09 3.73e-09 7.60e-09]
----- solver: yz_qcqp_admm  n = 250000  s = 10.00 -----


---------------------------------------
(x,y)-deviations: [1.94e-09 2.61e-09]
objective values:
                -555.635978726135363
                -555.635978726207441
Elapsed times:
                14.502108
                1.087954
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:56:27
---------------------------------------

fx >>
```

Figure 48: Historty Inner iteration Numbers for instructor's code

13 Output Figures and Screen Printout for $s = 10, n = 1000000$.

13.1 Output Figures ($s = 10, n = 1000000$).

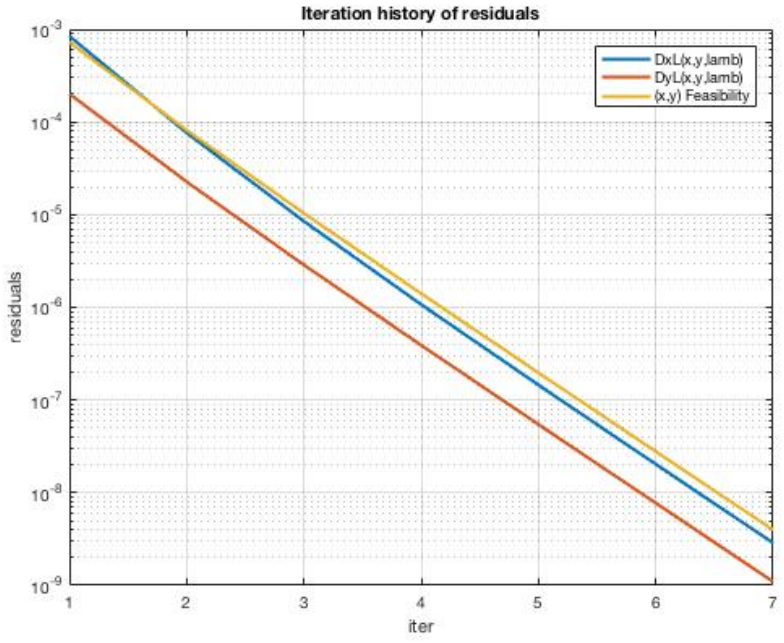

Figure 49: Iteration history residuals for my code

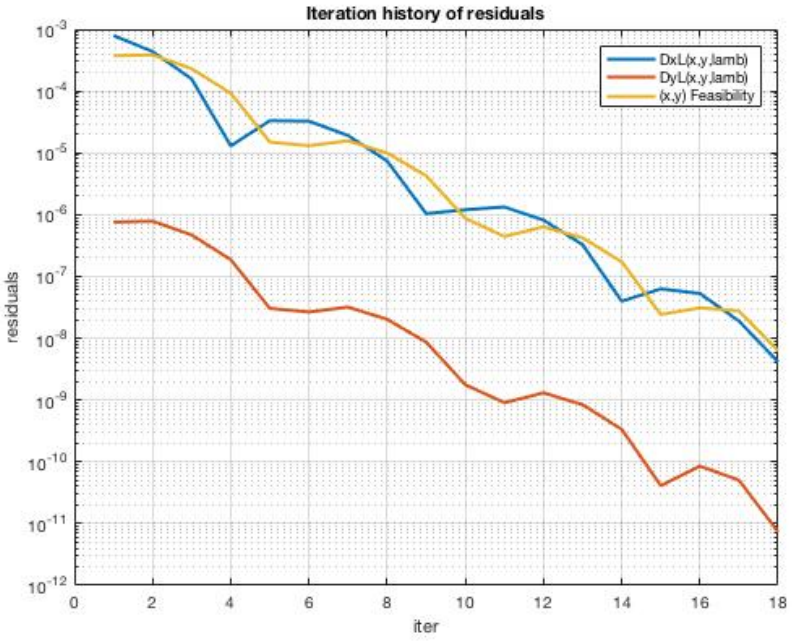

Figure 50: Iteration history residuals for instructor's code

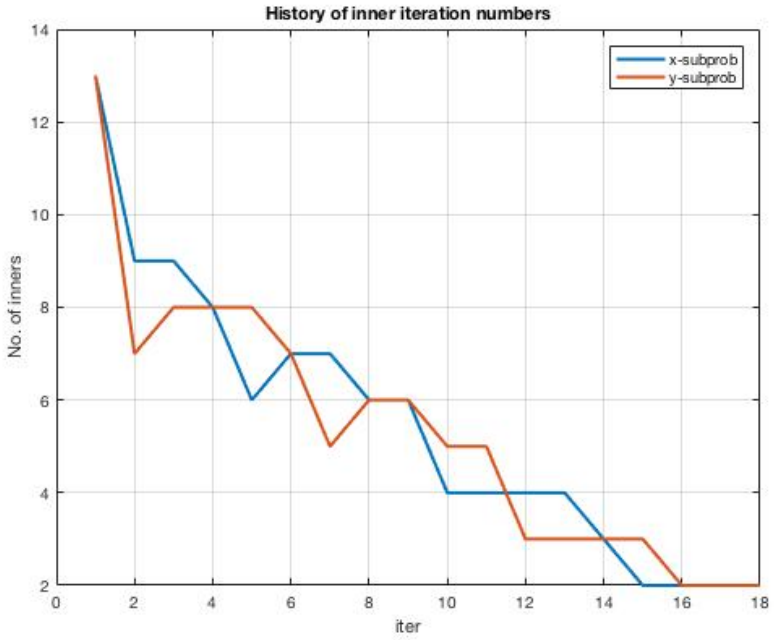

Figure 51: Historty Inner iteration Numbers for instructor's code

13.2 Screen Printout ($s = 10, n = 1000000$).

```
>> test_qcqp

parameter: n = problem size (default 3600)
parameter: s = scale b/c vs A (default 1)

n = 1000000
s = 10

----- solver: my_qcqp_admm  n = 1000000  s = 10.00 -----
iter  1: rres = [ 8.42e-04  2.01e-04  7.24e-04]
iter  2: rres = [ 7.63e-05  2.26e-05  8.15e-05]
iter  3: rres = [ 8.47e-06  2.87e-06  1.04e-05]
iter  4: rres = [ 1.07e-06  3.89e-07  1.41e-06]
iter  5: rres = [ 1.45e-07  5.45e-08  1.97e-07]
iter  6: rres = [ 2.03e-08  7.72e-09  2.79e-08]
iter  7: rres = [ 2.88e-09  1.10e-09  3.97e-09]
Convergence = 1 at iter 7
Elapsed time is 58.201802 seconds.
Stationarity: [1.09e-09 6.80e-10 3.97e-09]
----- solver: my_qcqp_admm  n = 1000000  s = 10.00 -----


----- solver: yz_qcqp_admm  n = 1000000  s = 10.00 -----
iter   1: rres = (7.91e-04 7.58e-07 3.73e-04)  time: 8.15e-01
iter  10: rres = (1.20e-06 1.77e-09 8.75e-07)  time: 3.84e+00
iter  18: rres = (4.14e-09 7.35e-12 6.24e-09)  time: 1.69e+00
Convergence = 1 at iter 18
Elapsed time is 6.371458 seconds.
Stationarity: [4.14e-09 1.92e-09 6.24e-09]
----- solver: yz_qcqp_admm  n = 1000000  s = 10.00 -----


---------------------------------------
(x,y)-deviations: [3.32e-09 7.00e-09]
objective values:
                -548.800499684019201
                -548.800499685339901
Elapsed times:
                58.202016
                6.371658
Computer: MACI64
Matlab version: 9.1.0.441655 (R2016b)
Date and time: 2018-12-19 11:59:14
---------------------------------------

fx >>
```

Figure 52: Historty Inner iteration Numbers for instructor's code