Report on code

Question1

(d)

编辑器 - /Users/yangjinglan/Desktop/YangJinglan-hw1/q1.m

q1.m | q2.m | q3.m

```
cvx_begin
    variable x1
    variable x2
    maximize 7.8*x1+7.1*x2
    subject to
        1/8*x1+1/2*x2<=90;
        1/4*x1+1/6*x2<=80;
        x1>=0;
        x2>=0;

cvx_end

x1
x2
```

命令行窗口

```
 norm(A), norm(b), norm(C) = 2.5e+00, 1.2e+02, 1.2e+01
 Total CPU time (secs)  = 0.10
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS: 1.9e-14  0.0e+00  4.6e-12  0.0e+00  3.7e-10  3.7e-10
------------------------------------------------------------------------

------------------------------------------------------------
Status: Solved
Optimal value (cvx_optval): +2724


x1 =

  240.0000


x2 =

  120.0000

>>
```

Question2

编辑器 - /Users/yangjinglan/Desktop/YangJinglan-hw1/q2.m

q1.m | q2.m | q3.m

```
cvx_begin

    variable X(5,5)
    W=[100,20,13,11,28;
        20,100,18,8,46;
        13,18,100,9,27;
        11,8,9,100,20;
        28,46,27,20,100];
    minimize sum(sum(W.*X))
    subject to
        sum(X(:,1))-sum(X(1,:))>=40;
        sum(X(2,:))-sum(X(:,2))<=135;
        sum(X(:,3))-sum(X(3,:))>=200;
        sum(X(4,:))-sum(X(:,4))<=220;
        sum(X(5,:))-sum(X(:,5))<=220;
        sum(X(1,:))<=110;
        sum(X(2,:))<=335;
        sum(X(3,:))<=400;
        sum(X(4,:))<=420;
        sum(X(5,:))<=610;
        for i = 1:5
            for j = 1:5
                X(i,j)>=0;
            end
        end

cvx_end

X
```

命令行窗口

```
Status: Solved
Optimal value (cvx_optval): +2400


X =

    0.0000    0.0000    0.0000    0.0000    0.0000
    0.0000    0.0000    0.0000   20.0000    0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000
   40.0000    0.0000  200.0000    0.0000    0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000
```

Question3

编辑器 - /Users/yangjinglan/Desktop/YangJinglan-hw1/q3.m

q3.m

```
W=input("Input an n*n matrix W(n>2): ");
[n,m]=size(W);
cvx_begin
    variable X(n,n);
    minimize sum(sum(W.*X));
    subject to
        sum(X(1,:))-sum(X(:,1))==1;
        sum(X(:,n))-sum(X(n,:))==1;
        for i=2:n-1
            sum(X(i,:))-sum(X(:,i))==0;
        end
        for i=1:n
            for j=1:n
                X(i,j)<=1;
                X(i,j)>=0;
            end
        end
cvx_end

X
```

```
>> q3
Input an n*n matrix W(n>2): [100,5,4,100,100,100,100,100;
        5,100,100,3,100,7,100,100;
        4,100,100,100,1,2,100,100;
        100,3,100,100,2,100,100,100;
        100,100,1,2,100,100,2,5;
        100,7,2,100,100,100,100,3;
        100,100,100,100,2,100,100,1;
        100,100,100,100,5,2,1,100]

Calling SDPT3 4.0: 136 variables, 64 equality constraints
   For improved efficiency, SDPT3 is solving the dual problem.
------------------------------------------------------------

 num. of constraints = 64
 dim. of linear var  = 128
 dim. of free   var  =  8 *** convert ublk to lblk
*****************************************************************
   SDPT3: Infeasible path-following algorithms
*****************************************************************
 version  predcorr  gam  expon  scale_data
    NT      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|1.5e+01|1.1e+06| 3.029219e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|1.000|8.0e-07|5.0e-01|4.7e+04| 2.386813e+04 -1.348474e+03| 0:0:00| chol  1  1
 2|1.000|1.000|6.7e-08|1.5e-01|3.2e+03| 1.212704e+03 -1.112367e+03| 0:0:00| chol  1  1
 3|0.881|0.916|1.8e-07|5.4e-02|4.0e+02| 1.926330e+02 -3.979935e+00| 0:0:00| chol  1  1
 4|0.832|0.948|4.4e-08|1.6e-02|7.3e+01| 3.268270e+01  1.257268e+01| 0:0:00| chol  1  1
 5|0.979|0.272|3.6e-08|1.2e-02|3.7e+01| 3.322365e+00  8.461316e+00| 0:0:01| chol  1  1
 6|0.974|0.608|1.2e-08|5.6e-03|1.5e+01|-4.608080e+00 -5.578724e-01| 0:0:01| chol  1  1
 7|1.000|0.763|3.6e-09|1.6e-03|3.2e+00|-7.687110e+00 -5.511840e+00| 0:0:01| chol  1  1
 8|0.982|0.977|1.2e-09|1.4e-04|7.4e-02|-7.993461e+00 -7.589650e+00| 0:0:01| chol  1  1
 9|0.986|0.943|3.0e-11|3.9e-05|4.0e-03|-7.999894e+00 -7.874459e+00| 0:0:01| chol  1  1
10|1.000|0.929|1.2e-12|1.3e-05|5.6e-04|-7.999906e+00 -7.960981e+00| 0:0:01| chol  1  1
11|0.989|0.989|3.2e-13|7.6e-07|1.7e-05|-7.999999e+00 -7.999552e+00| 0:0:01| chol  1  1
12|1.000|0.988|5.0e-14|2.3e-08|5.9e-07|-8.000000e+00 -7.999995e+00| 0:0:01| chol  1  1
13|1.000|0.988|1.6e-14|7.9e-10|2.2e-08|-8.000000e+00 -8.000000e+00| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.49e-08
```

```
------------------------------------------------------------------
 number of iterations   = 13
 primal objective value = -8.00000000e+00
 dual   objective value = -7.99999994e+00
 gap := trace(XZ)       = 2.17e-08
 relative gap           = 1.28e-09
 actual relative gap    = -3.41e-09
 rel. primal infeas (scaled problem)   = 1.58e-14
 rel. dual     "        "       "      = 7.86e-10
 rel. primal infeas (unscaled problem) = 0.00e+00
 rel. dual     "        "       "      = 0.00e+00
 norm(X), norm(y), norm(Z) = 6.5e+02, 2.0e+00, 8.0e+00
 norm(A), norm(b), norm(C) = 2.0e+01, 6.5e+02, 9.2e+00
 Total CPU time (secs)  = 0.58
 CPU time per iteration = 0.04
 termination code       =  0
 DIMACS: 1.0e-13  0.0e+00  3.6e-09  0.0e+00  -3.4e-09  1.3e-09
------------------------------------------------------------------

------------------------------------------------------------
Status: Solved
Optimal value (cvx_optval): +8


X =

   -0.0000    0.0000    1.0000   -0.0000   -0.0000   -0.0000   -0.0000   -0.0000
   -0.0000   -0.0000   -0.0000    0.0000   -0.0000   -0.0000   -0.0000   -0.0000
   -0.0000   -0.0000   -0.0000   -0.0000    1.0000    0.0000   -0.0000   -0.0000
   -0.0000    0.0000   -0.0000   -0.0000    0.0000   -0.0000   -0.0000   -0.0000
   -0.0000   -0.0000    0.0000    0.0000   -0.0000   -0.0000    1.0000    0.0000
   -0.0000   -0.0000    0.0000   -0.0000   -0.0000   -0.0000   -0.0000    0.0000
   -0.0000   -0.0000   -0.0000   -0.0000    0.0000   -0.0000   -0.0000    1.0000
   -0.0000   -0.0000   -0.0000   -0.0000   -0.0000    0.0000    0.0000   -0.0000
```