Report

Q1.

q1.m

```
cvx_begin
variables x y
maximize 2*x+y
subject to
    -3*x+2*y<=5;
    -x-2*y<=-2;
    5*x+2*y<=17;
cvx_end
x,y

cvx_begin
variables x1 y1
maximize 2*x1+y1
subject to
    -3*x1+2*y1<=5;
    -x1-2*y1<=-2;
    5*x1+2*y1<=17;
    x1<=1;
cvx_end
x1,y1

cvx_begin
variables x2 y2
maximize 2*x2+y2
subject to
    -3*x2+2*y2<=5;
    -x2-2*y2<=-2;
    5*x2+2*y2<=17;
    x2>=2;
cvx_end
x2,y2

```

```
cvx_begin
variables x3 y3
maximize 2*x3+y3
subject to
    -3*x3+2*y3<=5;
    -x3-2*y3<=-2;
    5*x3+2*y3<=17;
    x3>=2;
    y3<=3;
cvx_end
x3,y3

cvx_begin
variables x4 y4
maximize 2*x4+y4
subject to
    -3*x4+2*y4<=5;
    -x4-2*y4<=-2;
    5*x4+2*y4<=17;
    x4>=2;
    y4>=4;
cvx_end
x4,y4

cvx_begin
variables x5 y5
maximize 2*x5+y5
subject to
    -3*x5+2*y5<=5;
    -x5-2*y5<=-2;
    5*x5+2*y5<=17;
    x5<=2;
    y5<=3;
cvx_end
x5,y5
```

```

cvx_begin
variables x6 y6
maximize 2*x6+y6
subject to
    -3*x6+2*y6<=5;
    -x6-2*y6<=-2;
    5*x6+2*y6<=17;
    x6>=3;
    y6<=3;
cvx_end
x6,y6
```

x	1.5000
x1	1.0000
x2	2.0000
x3	2.2000
x4	NaN
x5	2.0000
x6	3.0000
y	4.7500
y1	4.0000
y2	3.5000
y3	3.0000
y4	NaN
y5	3.0000
y6	1.0000

Q2.

```
cvx_begin
variable x(5)
maximize 2*x(1)+x(2)+3*x(3)+2*x(4)+2*x(5)
subject to
    x(1)+x(3)<=1;
    x(1)+x(4)+x(5)<=2;
    x(2)+x(3)+x(4)<=3;
    x>=0;
    x<=1;
cvx_end
x
```

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


x =

    0.0000
    1.0000
    1.0000
    1.0000
    1.0000
```

Q3.

```
cvx_begin
variable x(7,2)
maximize 2*sum(x(1,:))+sum(x(2,:))+3*sum(x(3,:))+2*sum(x(4,:))+sum(x(5,:))+4*sum(x(6,:))+2*sum(x(7,:))
subject to
    2*x(1,1)+0.5*x(2,1)+0.5*x(3,1)+0.1*x(4,1)+0.5*x(5,1)+x(6,1)+1.5*x(7,1)<=3;
    2*x(1,2)+0.5*x(2,2)+0.5*x(3,2)+0.1*x(4,2)+0.5*x(5,2)+x(6,2)+1.5*x(7,2)<=2;
    for i=1:7
        x(i,1)+x(i,2)<=1;
    end
    x>=0;
    x<=1;
cvx_end
x
```

```
------------------------------------------------------------
Status: Solved
Optimal value (cvx_optval): +13.9


x =

    0.3319    0.1181
    0.5350    0.4650
    0.5317    0.4683
    0.5062    0.4938
    0.5350    0.4650
    0.5656    0.4344
    0.6127    0.3873
```

```
from pulp import *

prob=LpProblem("Problem",LpMaximize)

x11=LpVariable("var1",0,1,LpInteger)
x12=LpVariable("var2",0,1,LpInteger)
x21=LpVariable("var3",0,1,LpInteger)
x22=LpVariable("var4",0,1,LpInteger)
x31=LpVariable("var5",0,1,LpInteger)
x32=LpVariable("var6",0,1,LpInteger)
x41=LpVariable("var7",0,1,LpInteger)
x42=LpVariable("var8",0,1,LpInteger)
x51=LpVariable("var9",0,1,LpInteger)
x52=LpVariable("var10",0,1,LpInteger)
x61=LpVariable("var11",0,1,LpInteger)
x62=LpVariable("var12",0,1,LpInteger)
x71=LpVariable("var13",0,1,LpInteger)
x72=LpVariable("var14",0,1,LpInteger)

prob+=2*(x11+x12)+(x21+x22)+3*(x31+x32)+2*(x41+x42)+(x51+x52)+4*(x61+x62)+2*(x71+x72)


prob+=2*x11+0.5*x21+0.5*x31+0.1*x41+0.5*x51+x61+1.5*x71<=3
prob+=2*x12+0.5*x22+0.5*x32+0.1*x42+0.5*x52+x62+1.5*x72<=2
prob+=x11+x12<=1
prob+=x21+x22<=1
prob+=x31+x32<=1
prob+=x41+x42<=1
prob+=x51+x52<=1
prob+=x61+x62<=1
prob+=x71+x72<=1
prob.writeLP("hw9P3.lp")
```

```
prob.solve()

print("Status: ", LpStatus[prob.status])
for v in prob.variables():
    print(v.name,'=',v.varValue)
```

```
Objective value:                13.00000000
Enumerated nodes:               0
Total iterations:               0
Time (CPU seconds):             0.00
Time (Wallclock seconds):       0.00

Option for printingOptions changed from normal to all
Total time (CPU seconds):       0.00   (Wallclock seconds):       0.00

Status:  Optimal
var1 = 0.0
var10 = 0.0
var11 = 0.0
var12 = 1.0
var13 = 1.0
var14 = 0.0
var2 = 0.0
var3 = 1.0
var4 = 0.0
var5 = 0.0
var6 = 1.0
var7 = 0.0
var8 = 1.0
var9 = 1.0
```