

# Code for HW3

*Korawat Tanwisuth*

*February 20, 2018*

1

```
library(lpSolve)
#1
A = matrix(c(-10,5,1,20,10,0), ncol =2)
b = matrix(c(22,49,5),ncol =1)
signs = rep("<=", 3)
z = c(-1,4)
ans =lp("max",z , A,signs,b,int.vec = 1:2)
ans$solution
```

```
## [1] 2 2
```

```
ans
```

```
## Success: the objective function is 6
```

2

```
#2
b <- c(11,rep(1,6))
A <- matrix(0,ncol=4,nrow=7)
A[1,] <- c(6,3,5,2)
A[2:5,] <- diag(4)
A[6,] <- c(0,0,1,1)
A[7,] <- c(-1,-1,0,0)
z = c(9,5,6,4)
signs <- rep("<=",7)
ans = lp("max",z,A,signs,b,int.vec = 1:4)
ans$solution
```

```
## [1] 1 1 0 1
```

```
ans
```

```
## Success: the objective function is 18
```

3

```
b = rep(1,12)
A = matrix(0,ncol=12,nrow=12)
A[1,] <- c(1,0,1,0,1,0,rep(1,3),rep(0,3))
A[2,] <- c(0,1,rep(0,5),1,1,rep(0,3))
A[3,] <- c(1,0,1,rep(0,3),rep(1,3),rep(0,3))
A[4,] <- c(rep(0,3),1,rep(0,5),1,rep(0,2))
A[5,] <- c(1,rep(0,3),1,0,1,rep(0,5))
```

```

A[6,] <- c(rep(0,5),1,rep(0,3),1,1,0)
A[7,] <- c(rep(c(1,0),4),rep(0,4))
A[8,] <- c(rep(1,3),rep(0,4),1,1,rep(0,3))
A[9,] <- c(rep(1,3),rep(0,4),1,1,rep(0,3))
A[10,] <- c(rep(0,3),1,0,1,rep(0,3),rep(1,3))
A[11,] <- c(rep(0,5),1,rep(0,3),rep(1,3))
A[12,] <- c(rep(0,9),rep(1,3))
z = rep(1,12)
signs <- rep(">=",12)
ans = lp("min",z,A,signs,b,binary.vec = 1:12)
ans$solution

```

```
## [1] 1 0 0 0 0 0 0 1 0 1 0 0
```

```
ans
```

```
## Success: the objective function is 3
```

4

```

b <- matrix(c(233,148,106),ncol=1)
finals <- c(25,37,54)
mincut <- floor(120/finals)
res <- matrix(0,ncol = 3)
for(i in 0:mincut[1]){
  for(j in 0:mincut[2]){
    for(k in 0:mincut[3]){
      pattern <- c(i,j,k)
      if(sum(pattern*finals)<=120 & sum(pattern)!= 0){
        res <- rbind(res,pattern)
      }
    }
  }
}
A <- matrix(t(res[2:nrow(res),]),ncol=nrow(res)-1)
z <- matrix(120-t(A)%*%finals)
signs <- rep("=", nrow(A))
ans = lp("min",z,A,signs,b,int.vec=1:17)
ans$solution

```

```
## [1] 0 7 0 0 0 3 0 0 0 92 0 0 0 0 0 47 0
```

```
ans
```

```
## Success: the objective function is 855
```

5

```

A <- matrix(0,ncol=7,nrow = 7)
for(i in 0:6){
  temp <- rep(1,7)
  except <- c(((i+1)%7)+1,((i+2)%7)+1)
  temp[except] <- rep(0,length(except))
  A[i+1,] <- temp
}

```

```

}

b <- c(5,13,12,10,14,8,6)
signs <- rep(">=",7)
z <- c(330,300,330,360,360,360,360)
ans = lp("min",z,A,signs,b,int.vec = 1:7)
ans$solution

## [1] 1 8 2 0 3 0 1
ans

## Success: the objective function is 4830

```