Sairaj Chalke
SYCS – A
5266

Practical No. 5

Install LPP Packages

```
> install.packages("lpSolve")
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.icts.res.in/bin/windows/contrib/4.3/lpSolve_5.6.20.zip'
Content type 'application/zip' length 360103 bytes (351 KB)
downloaded 351 KB

package 'lpSolve' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\Student\AppData\Local\Temp\Rtmp0IHVpW\downloaded_packages
> # india bangluru
> library("lpSolve")
Warning message:
package 'lpSolve' was built under R version 4.3.2
>
```

Q1. Find optimal assignment and minimum cost for the following.

	M1	M2	M3
A	1	2	3
B	2	3	3
C	5	1	3

Output:

```
> cost.mat=rbind(c(1,2,3),c(2,3,3),c(5,1,3))
> s=lp.assign(cost.mat,direction="min")
> s
Success: the objective function is 5
> s$solution
     [,1] [,2] [,3]
[1,]    1    0    0
[2,]    0    0    1
[3,]    0    1    0
>
> #A M1 1
> #B M3 3
> #C M2 1
```

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Q2. Find optimal assignment and minimum cost for the following.

	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	2

Output:

```
> cost.mat=rbind(c(10,5,13,15,16),c(3,9,18,13,6),c(10,7,2,2,2),c(7,11,9,7,12),c(7,9,10,4,2))
> s=lp.assign(cost.mat,direction="min")
> s
Success: the objective function is 19
> s$solution
     [,1] [,2] [,3] [,4] [,5]
[1,]    0    1    0    0    0
[2,]    1    0    0    0    0
[3,]    0    0    1    0    0
[4,]    0    0    0    1    0
[5,]    0    0    0    0    1
>
> #A II 5
> #B I  3
> #C III 2
> #D IV 7
> #E V  2
```

Q3. Find optimal assignment and minimum cost for the following.

	A	B	C	D
I	120	100	80	90
II	80	90	110	70
III	110	140	120	100
IV	90	90	80	90

Output:

```
> cost.mat=rbind(c(120,100,80,90),c(80,90,110,70),c(110,140,120,100),c(90,90,80,90))
> s=lp.assign(cost.mat,direction="min")
> s
Success: the objective function is 350
> s$solution
     [,1] [,2] [,3] [,4]
[1,]    0    0    1    0
[2,]    0    0    0    1
[3,]    1    0    0    0
[4,]    0    1    0    0
>
> #I C 80
> #II D 70
> #III A 110
> #IV B 90
```

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Q4. Find optimal assignment and minimum cost for the following.

	S1	S2	S3	S4
T1	5	6	8	9
T2	6	8	10	6
T3	9	5	8	5
T4	9	8	7	1

Output:

```
> cost.mat=rbind(c(5,6,8,9),c(6,8,10,6),c(9,5,8,5),c(9,8,7,1))
> s=lp.assign(cost.mat,direction="min")
> s
Success: the objective function is 20
> s$solution
     [,1] [,2] [,3] [,4]
[1,]    0    0    1    0
[2,]    1    0    0    0
[3,]    0    1    0    0
[4,]    0    0    0    1
>
> #T1 S3 8
> #T2 S1 6
> #T3 S2 5
> #T4 S4 1
```

Q5. Find optimal assignment and maximum cost for the following.

	I	II	III	IV
A	42	35	28	21
B	30	25	20	15
C	30	25	20	15
D	24	20	16	12

Output:

```
> cost.mat=rbind(c(42,35,28,21),c(30,25,20,15),c(30,25,20,15),c(24,20,16,12))
> s=lp.assign(cost.mat,direction="max")
> s
Success: the objective function is 99
> s$solution
     [,1] [,2] [,3] [,4]
[1,]    1    0    0    0
[2,]    0    1    0    0
[3,]    0    0    1    0
[4,]    0    0    0    1
>
> #A I 42
> #B II 25
> #C III 20
> #D IV 12
```

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Q6. Find optimal assignment and maximum cost for the following.

	A	B	C	D	E
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

Output:

```
> cost.mat=rbind(c(30,37,40,28,40),c(40,24,27,21,36),c(40,32,33,30,35),c(25,38,40,36,36),c(29,62,41,34,39))
> s=lp.assign(cost.mat,direction="max")
> s
Success: the objective function is 214
> s$solution
     [,1] [,2] [,3] [,4] [,5]
[1,]    0    0    1    0    0
[2,]    0    0    0    0    1
[3,]    1    0    0    0    0
[4,]    0    0    0    1    0
[5,]    0    1    0    0    0
>
> #1 C 40
> #2 E 36
> #3 A 40
> #4 D 36
> #5 B 62
```

Q7. Find optimal assignment and minimum cost for the following.

	MON	TUE	WED	THU	FRI
A	2	4	8	4	6
B	3	2	7	3	2
C	6	8	6	5	4
D	7	4	3	6	8
E	4	5	3	1	4

Output:

```
> cost.mat=rbind(c(2,4,8,4,6),c(3,2,7,3,2),c(6,8,6,5,4),c(7,4,3,6,8),c(4,5,3,1,4))
> s=lp.assign(cost.mat,direction="max")
> s
Success: the objective function is 31
> s$solution
     [,1] [,2] [,3] [,4] [,5]
[1,]    0    0    1    0    0
[2,]    0    0    0    1    0
[3,]    0    1    0    0    0
[4,]    0    0    0    0    1
[5,]    1    0    0    0    0
>
> #A WED 8
> #B THU 3
> #C TUE 8
> #D FRI 8
> #E MON 4
```