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15/ENG02/040
COMPUTER ENG

Class Work
NO 2

(2) From the exercise

∴ X_1 = No of keyboards, table shipped from Kansas to New York
X_2 = " " " " Kansas to California
X_3 = " " " " Mexico to New York
X_4 = " " " " Mexico to California

∴ Objective function: $C = 2x_1 + 3x_2 + 4x_3 + x_4$

Production

State	Cartons
Kansas	15
Mexico	8

Consumption

State	Bags
New York	10
California	13

Production constraints

$x_1 + x_2 \geq 15$
$x_3 + x_4 \geq 8$

$x_1, x_2, x_3, x_4 \geq 0$

Consumption constraints

$x_1 + x_3 \geq 10$
$x_2 + x_4 \geq 13$

Hence =>

x_1	x_2	x_3	x_4	
1	1	0	0	15
0	0	1	1	8
1	0	1	0	10
0	1	0	1	13
2	3	4	1	0

=> Transpose

1	0	1	0	2
1	0	0	1	3
0	1	1	0	4
0	1	0	1	1
15	8	10	13	0

inserting slack variables $S_1 \rightarrow S_4$

$$y_1 + y_3 + S_1 \leq 2$$
$$y_1 + y_4 + S_2 \leq 3$$
$$y_2 + y_3 + S_3 \leq 4$$
$$y_2 + y_4 + S_4 \leq 1$$

$$Z = 15y_1 + 8y_2 + 10y_3 + 13y_4$$
$$Z - 15y_1 - 8y_2 - 10y_3 - 13y_4 = 0$$

y_1	y_2	y_3	y_4	S_1	S_2	S_3	S_4	P	i
1	0	1	0	1	0	0	0	0	2
1	0	0	1	0	1	0	0	0	3
0	1	1	0	0	0	1	0	0	4
0	1	0	1	0	0	0	1	0	1
-15	-8	-10	-13	0	0	0	0	1	0

$R_2 \rightarrow R_2 - R_3$

No 1

Parameters:

Where d_i = demand estimates for all months

e_i = No of employees during the given month

x_i = No of carpets made during the month

wh_i = No of workers hired at the start of the month

wf_i = No of workers fired

y_i = No of carpets made overtime

s_i = stored carpet at the end of the given month

i = given month

Where $e_i = y_i, x_i, wh_i, wf_i, s_i$

No of carpet produced monthly = $x_i = 20 e_i + y_i$

No of employees at the begining of the month $\Rightarrow e_i = e_{i-1} + wh_i$

No of stored carpets: $s_i = s_{i-1} + x_i - e_i$

$\therefore$ Objective function:

$$\text{Min } Z = 2000 \sum_i e_i + 320 \sum_i wh_i + 400 \sum_i wf_i + 8 \sum_i s_i + 180 \sum_i$$