

Jobs () n
 m (machines)

=)
 $(n < m)$

$(m - n)$ $m = n$ (
 $(n > m)$ $(n - m)$

: : minimized -
 .1

. .2

. .3

()

() .4

)

(2) .5

: maximized -

:

: 2-_____

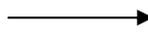
<i>jobs</i>	<i>machines</i>				
	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>	<i>M5</i>
<i>J1</i>	10	11	4	2	8
<i>J2</i>	7	11	10	14	12
<i>J3</i>	5	6	9	12	14
<i>J4</i>	13	15	11	10	7

5 =

> 4 =

: _____

	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>	<i>M5</i>
<i>J1</i>	10	11	4	2	8
<i>J2</i>	7	11	10	14	12
<i>J3</i>	5	6	9	12	14
<i>J4</i>	13	15	11	10	7
<i>J5</i>	0	0	0	0	0



	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>	<i>M5</i>
<i>J1</i>	8	9	2	0	6
<i>J2</i>	0	4	3	7	5
<i>J3</i>	0	1	4	7	9
<i>J4</i>	6	8	4	3	0
<i>J5</i>	0	0	0	0	0

()

> 4 =

(1)

. 5 =

5 =

=

	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>	<i>M5</i>
<i>J1</i>	9	9	2	0	7
<i>J2</i>	0	3	2	6	5
<i>J3</i>	0	0	3	6	9
<i>J4</i>	6	7	3	2	0
<i>J5</i>	1	0	0	0	1

:

<i>Jobs</i>	<i>Machines</i>
<i>J1</i>	<i>M4</i>
<i>J2</i>	<i>M1</i>
<i>J3</i>	<i>M1 , M2</i>
<i>J4</i>	<i>M5</i>
<i>J5</i>	<i>M2 , M3 , M4</i>

-1

a)

Sources	Destinations			Supply
	D1	D2	D3	
S1	1	2	6	7
S2	0	4	2	12
S3	3	1	5	11
Demand	10	10	10	30

b)

Sources	Destinations			Supply
	D1	D2	D3	
S1	5	1	8	12
S2	2	4	0	14
S3	3	6	7	4
Demand	9	10	11	30

c)

Sou.	Dest.			Sup.
	D1	D2	D3	
S1	5	1	7	10
S2	6	4	6	80
S3	3	2	2	15
Dem.	75	20	50	

Sou.	Dest.				Sup.
	D1	D2	D3	D4	
S1	10	20	5	7	10
S2	13	9	12	8	20
S3	4	15	7	9	30
S4	14	7	1	0	40
S5	3	12	5	19	50
Dem.	60	60	20	10	150

(ans. : a)(7,0,0,2,0,10,1,10,0;40) , b)(2,10,0,3,0,11,4,0,0;38) ,
 c)(0,10,0,35,10,35,0,0,15,40,0,0;500) ,
 d)(0,0,10,0,0,20,0,0,30,0,0,0,0,30,0,10,30,10,10,0;820))

M5 , M4 , M3 ,

W4 , W3 , W2 , W1

-2

30 60 40 70

. M2 , M1

50 60 30 20 40

Warehouses	Markets				
	M1	M2	M3	M4	M5
W1	7	6	5	4	2
W2	9	7	3	6	3
W3	8	8	7	3	1
W4	4	3	1	2	1

(ans.: (30,0,0,40,0,0,0,30,0,10,0,0,0,20,40,10,20,0,0,0;690))

: S4

D1

-3

Sources	Destinations			Supply
	D1	D2	D3	
S1	5	1	0	20
S2	3	2	4	10
S3	7	5	2	15
S4	9	6	0	15
Demand	5	10	15	

(ans.: (0,10,5,5,5,0,0,0,10,0,0,0,15,5,0,10,0;55))

-4

20 20

30 20 30 25

M4

. 25 10 30

:

. J4

machines	Jobs				
	J1	J2	J3	J4	J5
M1	10	2	3	15	9
M2	5	10	15	2	4
M3	15	5	14	7	15
M4	20	15	13	----	8

(ans.:(0,0,25,0,0,20,0,0,10,0,0,20,0,0,0,0,5,0,25;560))

-5

:

a)

Jobs	machines			
	M1	M2	M3	M4
J1	10	5	5	2
J2	9	8	4	3
J3	7	7	6	4
J4	8	7	5	5

b)

Jobs	Machines				
	M1	M2	M3	M4	M5
J1	3	8	2	10	3
J2	8	7	2	9	7
J3	6	4	2	7	5
J4	8	4	2	3	5
J5	9	10	6	9	10

(ans.:a) 1-2,2-4,3-1,4-3 or 1-4,2-3,3-1,4-2;20, b) 1-5 , 2-3 , 3-2 , 4-4 , 5-1 ;21)

-6

:

Jobs	Machines				
	M1	M2	M3	M4	M5
J1	3	9	2	3	7
J2	6	1	5	6	6
J3	9	4	7	10	3
J4	2	5	4	2	1
J5	9	6	2	4	6

(ans.:1-2 , 2-5 , 3-4 , 4-3 , 5-1 ;38)

P1

-7

:

M4

P3

M3

<i>Processes</i>	<i>machines</i>			
	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>
<i>P1</i>	5	5	---	2
<i>P2</i>	7	4	2	3
<i>P3</i>	9	3	5	---
<i>P4</i>	7	2	6	7

(ans.: 1-4, 2-3, 3-2, 4-1 ; 14)

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-8

<i>Engineering</i>	<i>Lines</i>			
	<i>L1</i>	<i>L2</i>	<i>L3</i>	<i>L4</i>
<i>E1</i>	8	9	6	4
<i>E2</i>	5	7	7	8
<i>E3</i>	10	11	6	8
<i>E4</i>	3	9	5	7

:

. *L4*

E1

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(ans.: a)1-4, 2-2, 3-3, 4-1;20, b)1-3, 2-2, 3-4, 4-1 ; 24 ; 4)