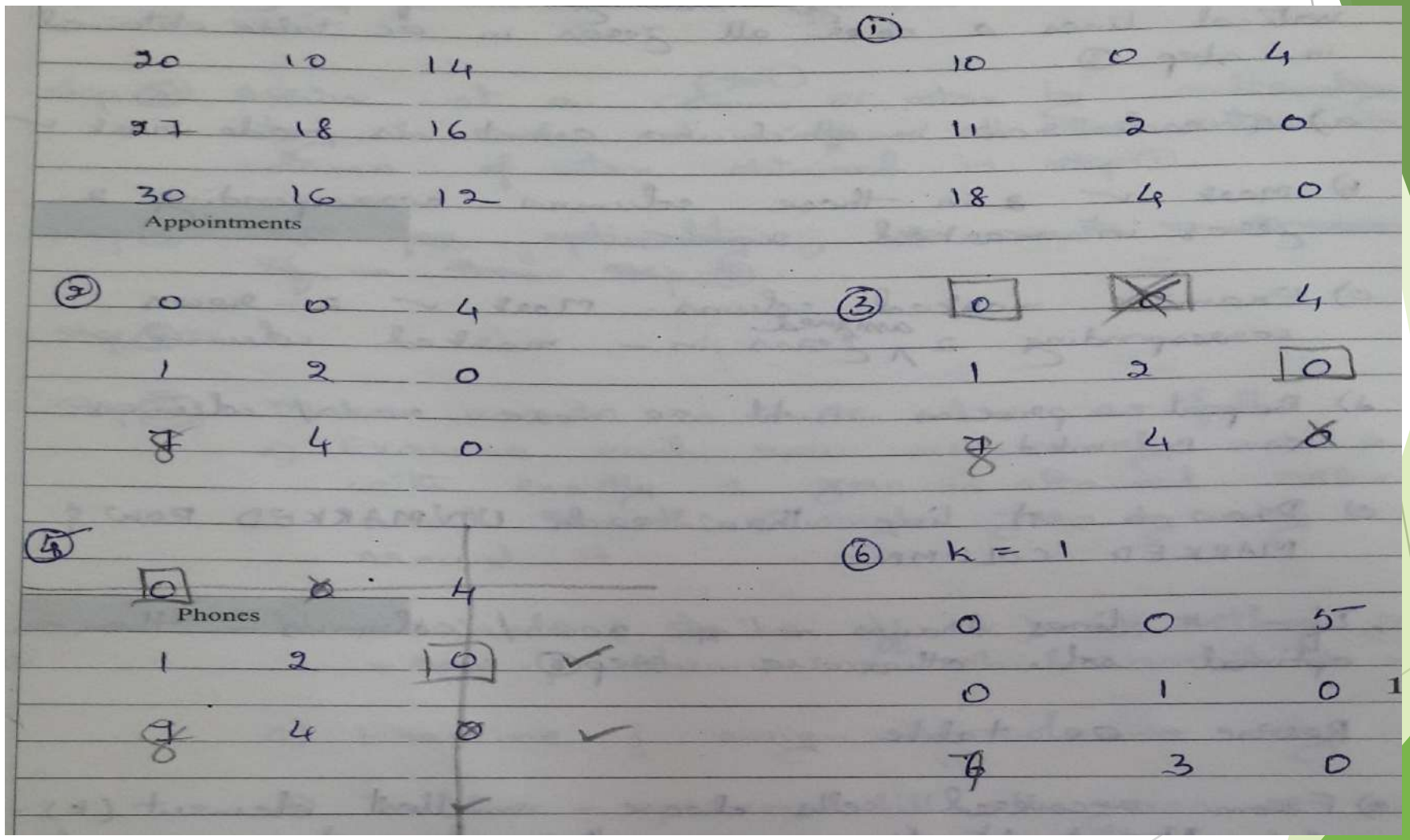
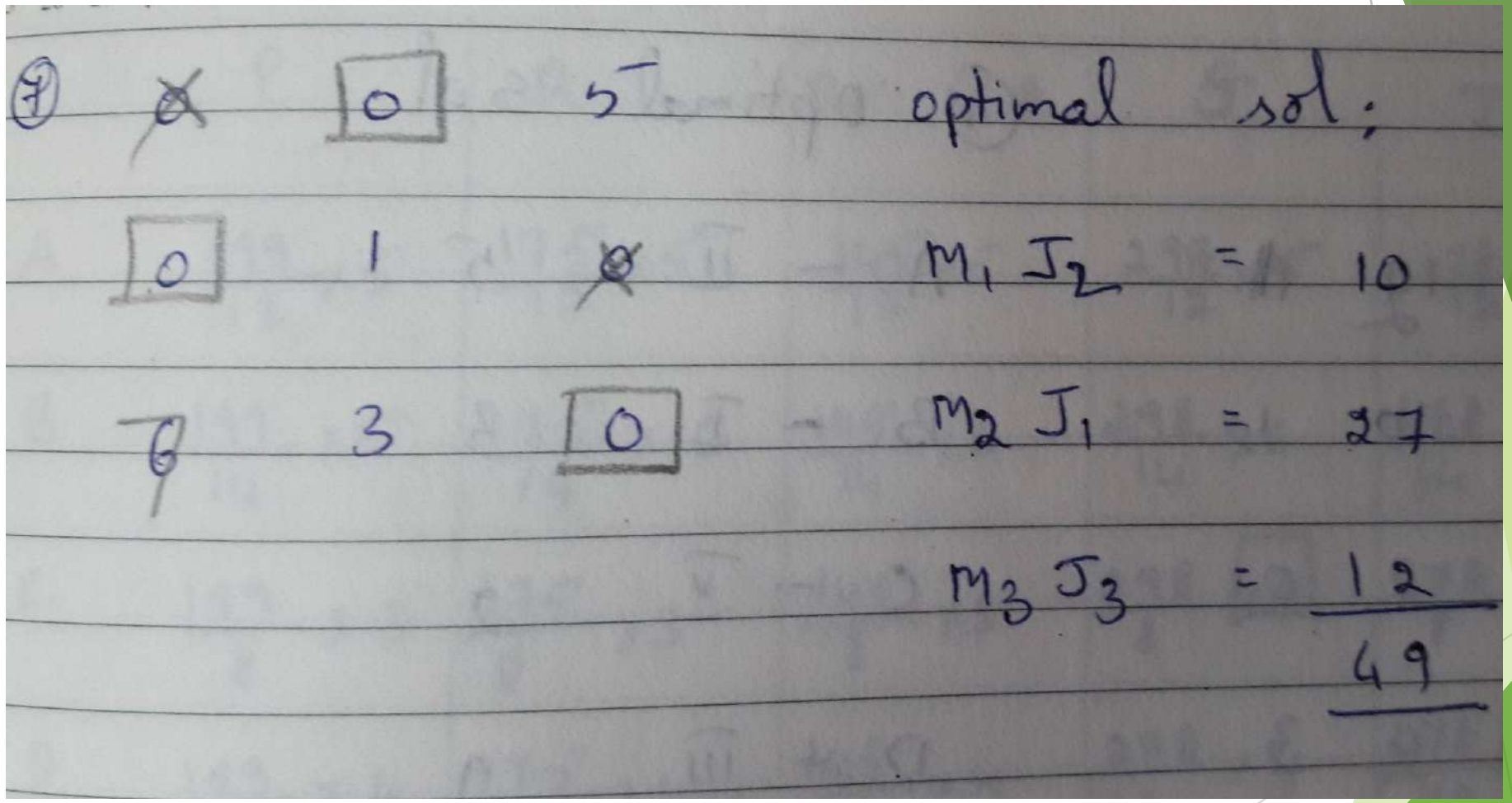
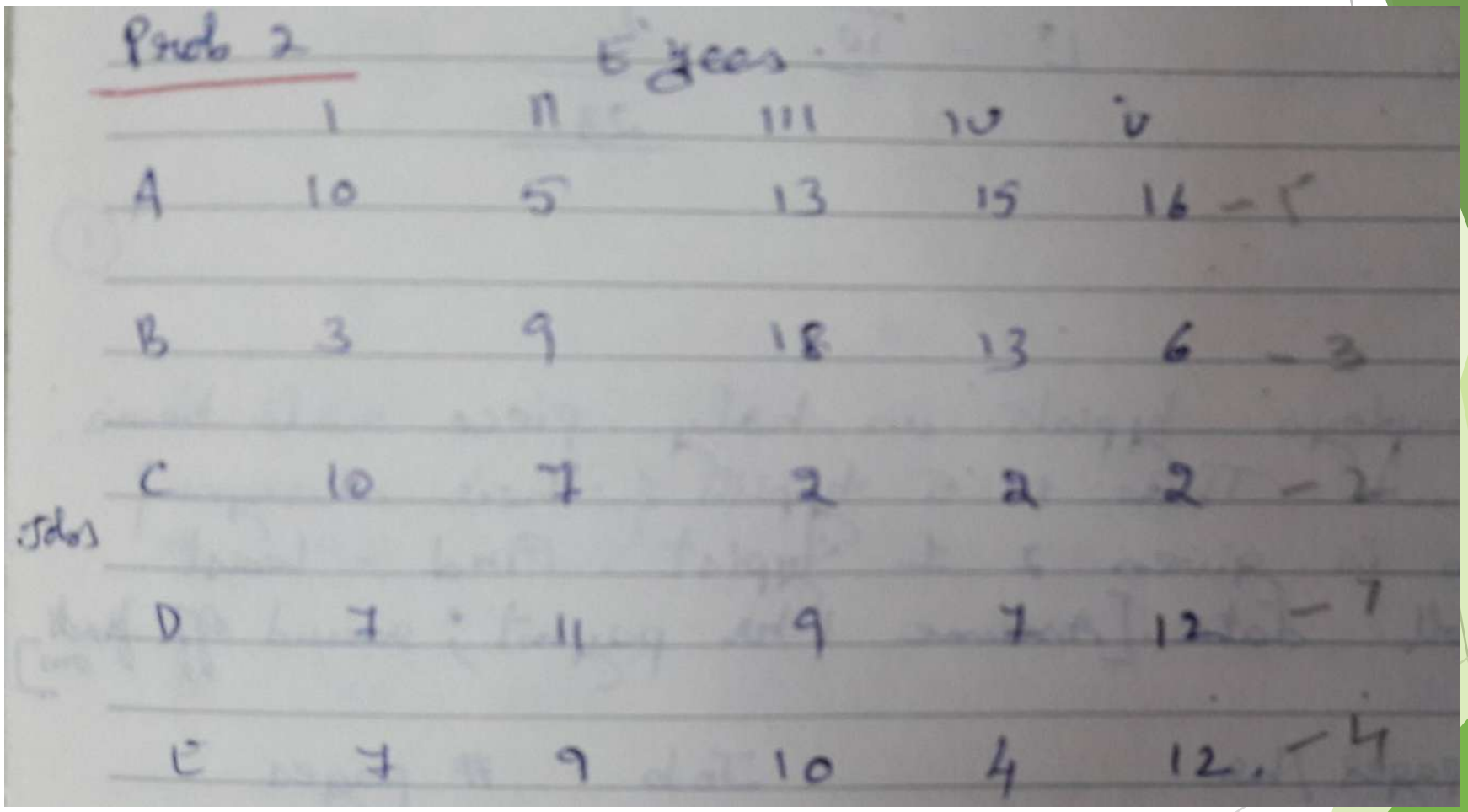
AP

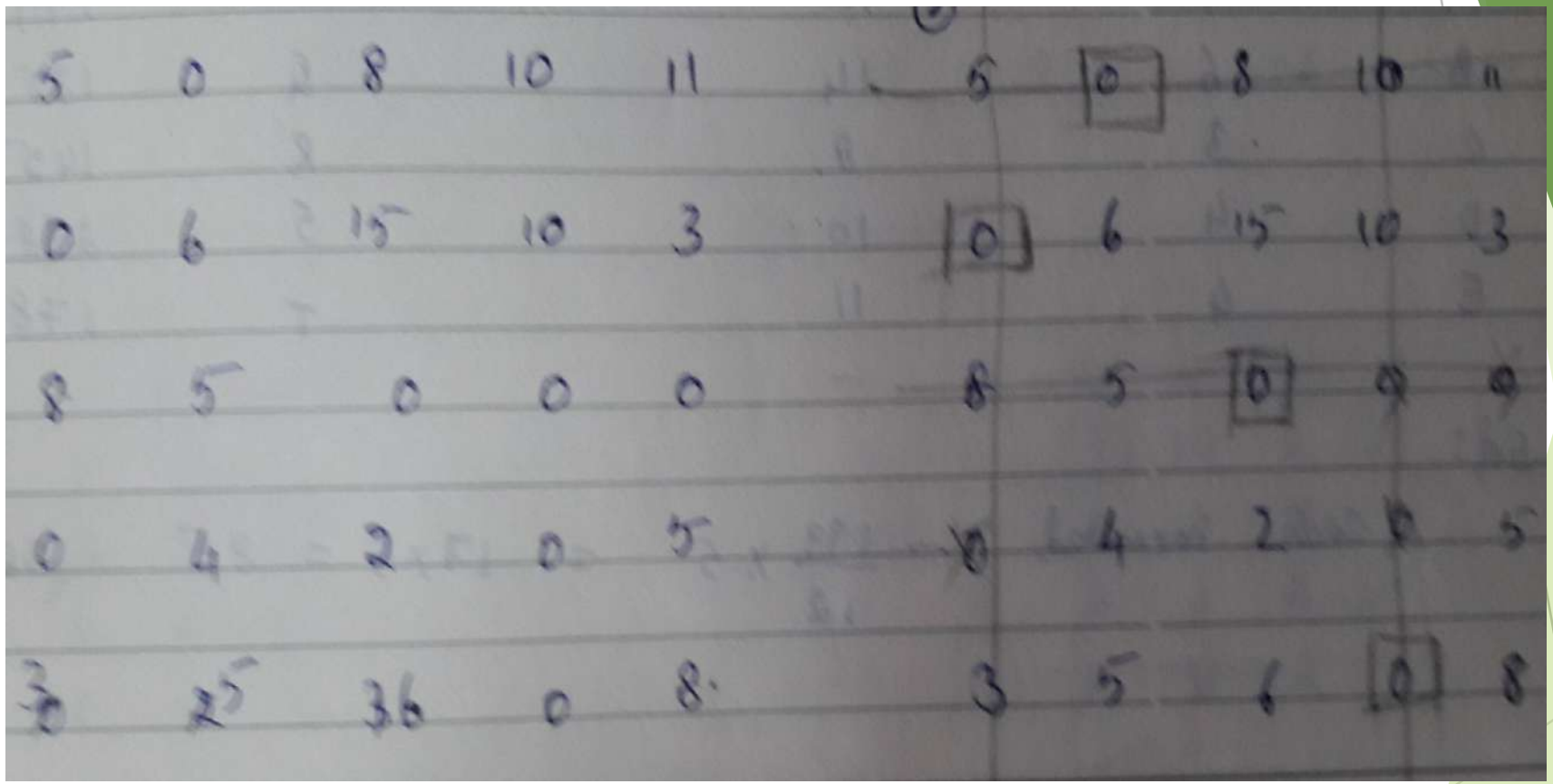
Cont.

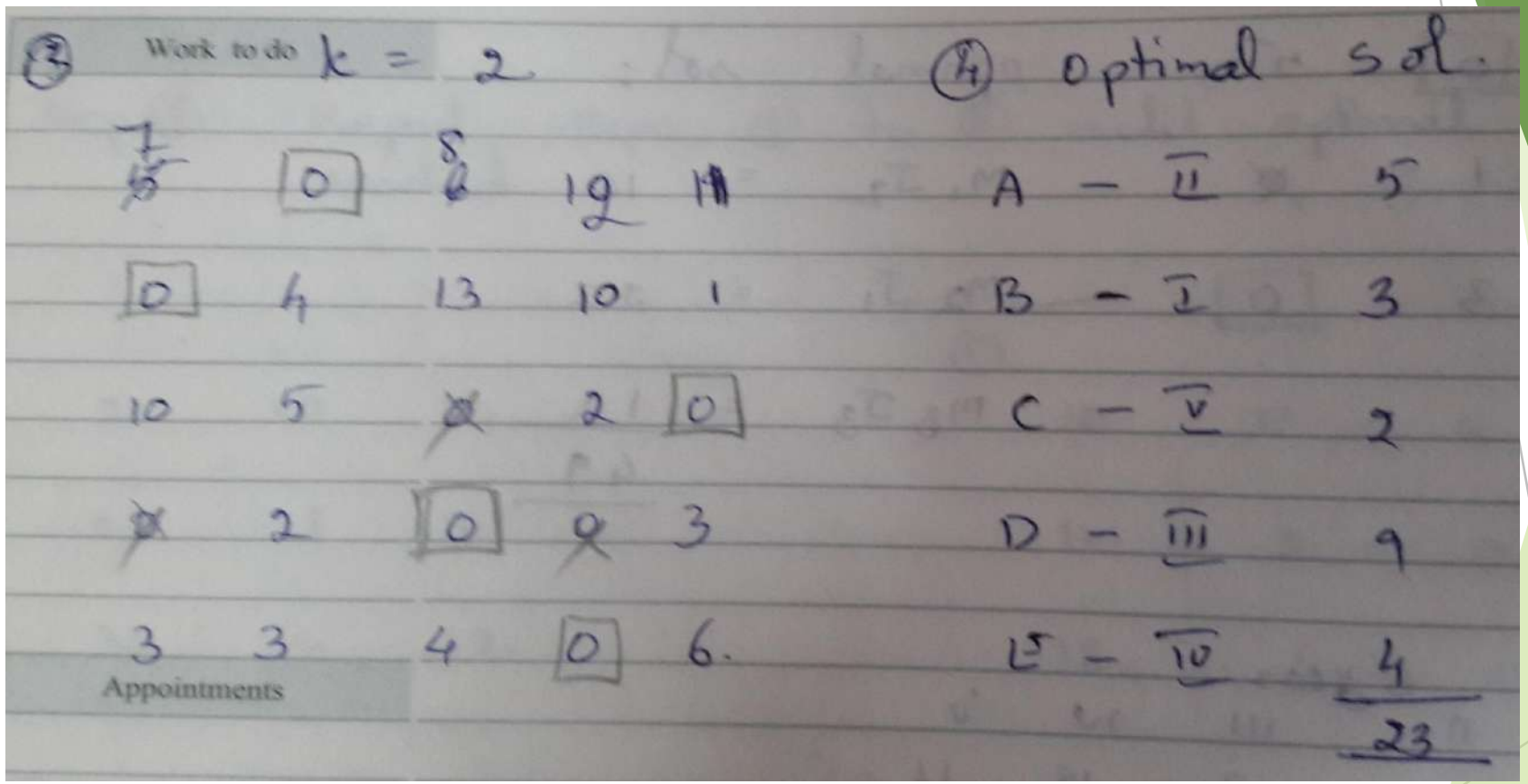
Job / Machine	J_1	J_2	J_3	Machine capacity
M_1	20	10	14	1
M_2	27	18	16	1
M_3	30	16	12	1
Job Req^{nt}	1	1	1	3


20 10 14
27 18 16
30 16 12
Appointments
2
0 0 4
1 2 0
7 4 0
3
0 0 4
1 2 0
7 4 0
4
0 0 4
Phones
1 2 0
7 4 0
1
10 0 4
11 2 0
18 4 0
6
k = 1
0 0 5
0 1 0
3 0


⑦ ✗ 0 5⁻ optimal sol:
0 1 ✗ $M_1 J_2 = 10$
6 3 0 $M_2 J_1 = 27$
$M_3 J_3 = \frac{12}{49}$


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

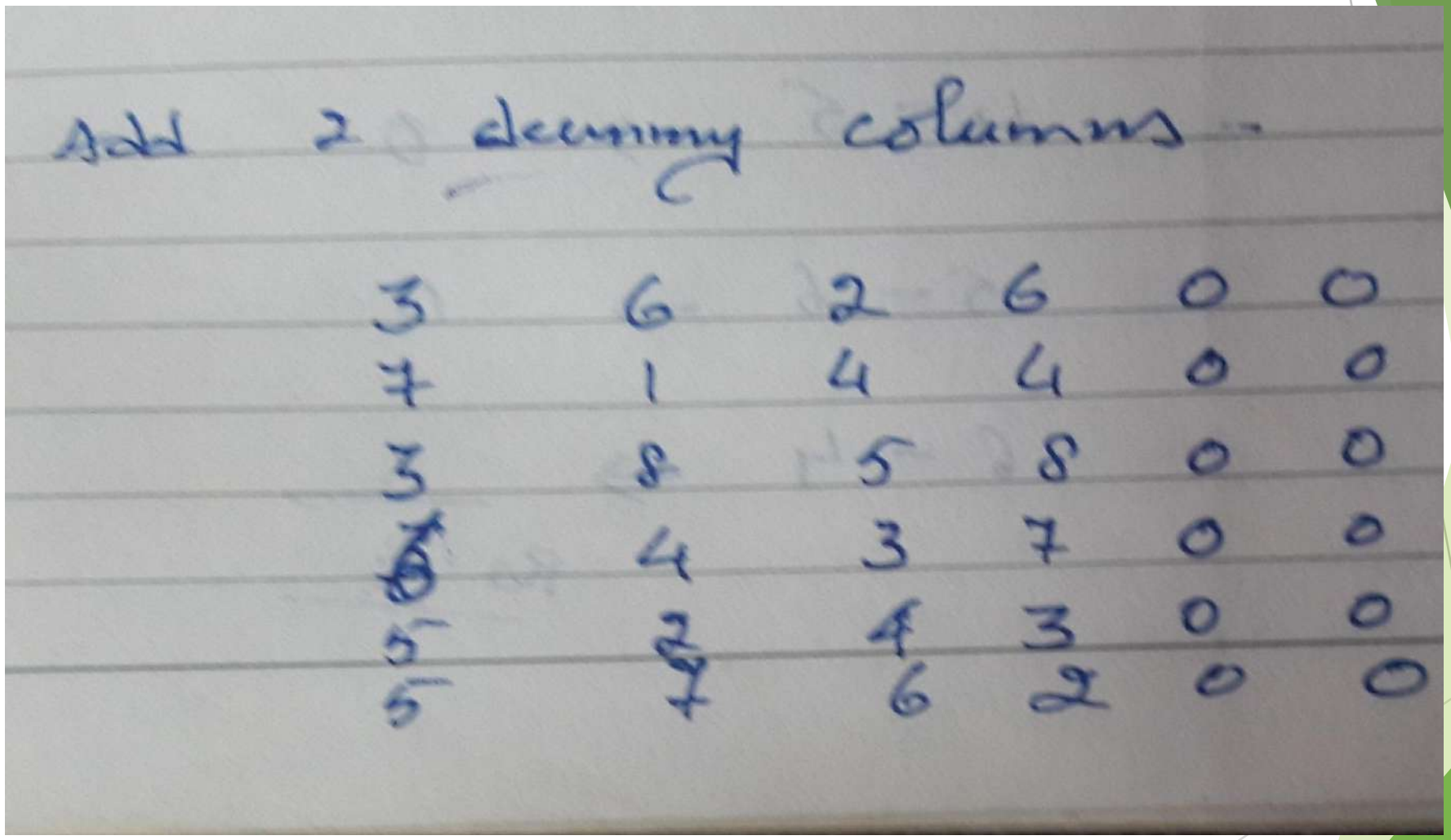

5 0 8 10 11
0 6 15 10 3
8 5 0 0 0
0 4 2 0 5
3 25 36 0 8
5 0 8 10 11
0 6 15 10 3
8 5 0 0 0
0 4 2 0 5
3 5 6 0 8

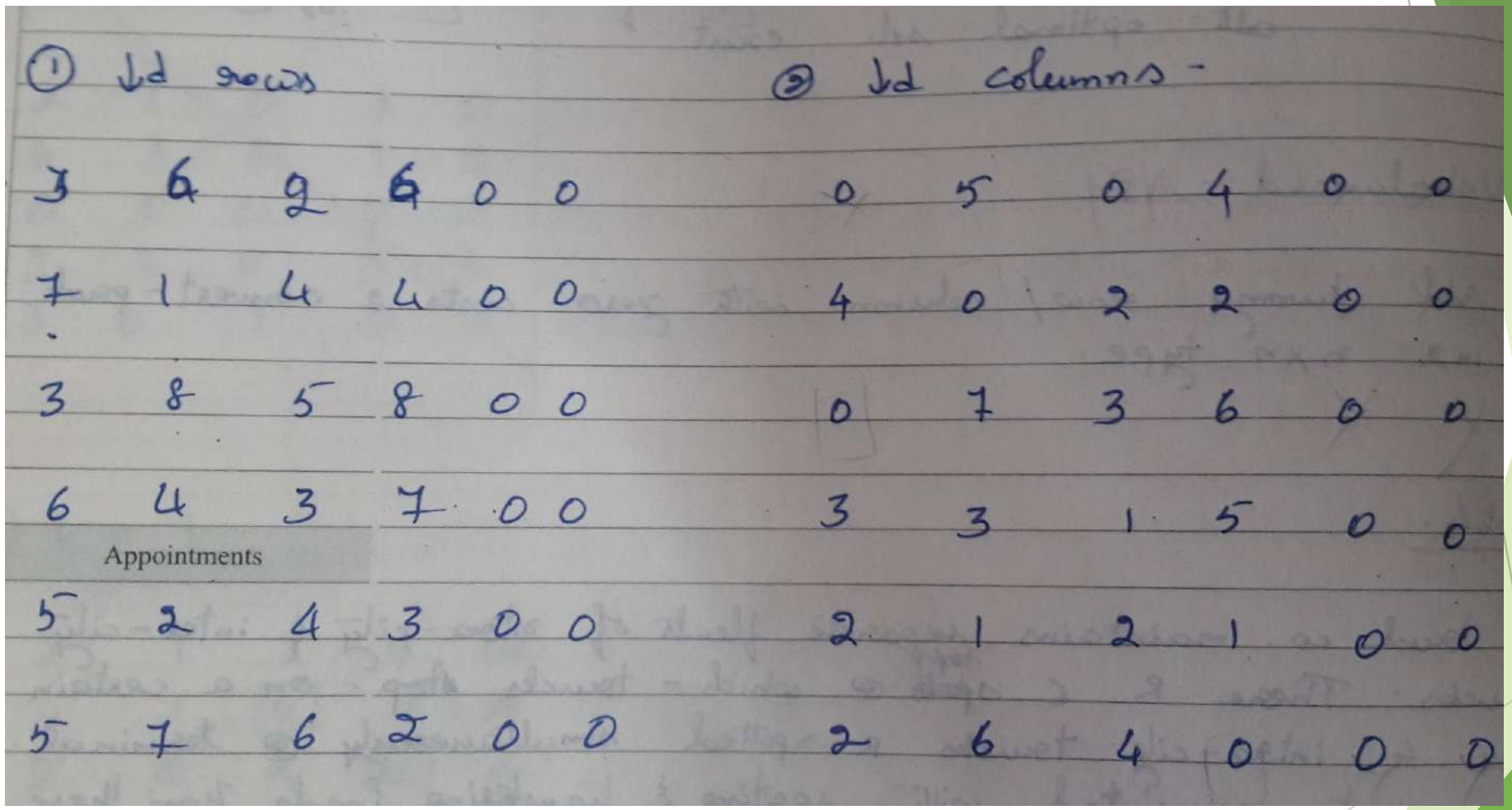

③ Work to do k = 2
7 0 8 19 11
0 4 13 10 1
10 5 2 0
2 0 3
3 3 4 0 6.
Appointments
④ optimal sol.
A - II 5
B - I 3
C - V 2
D - III 9
E - IV 4
23

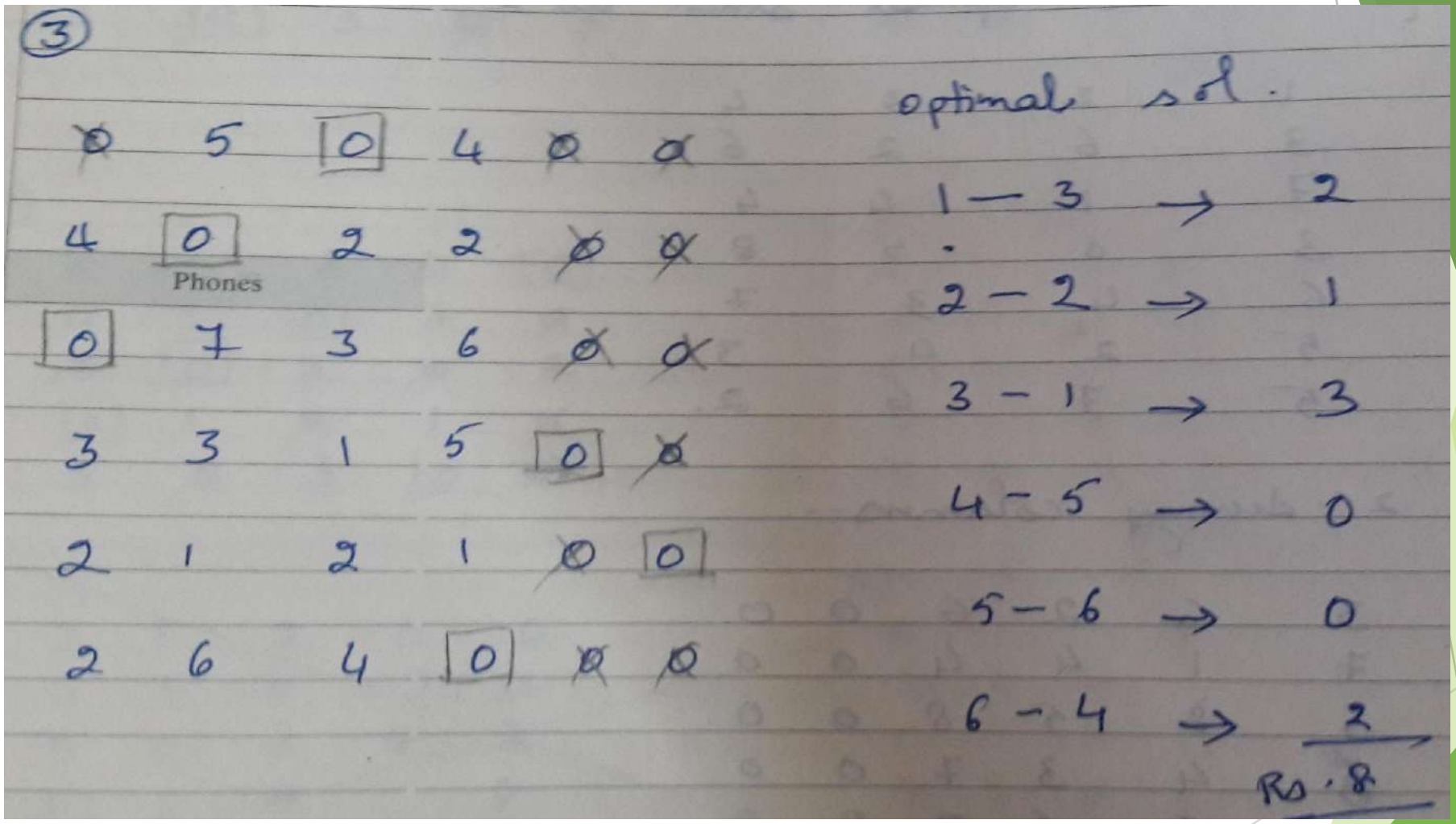
A truck co. maintains separate fleets of intra-city & inter-city trucks. There R 6 stops @ which - trucks stop. On a certain day 4 intra-city trucks R spotted simultaneously @ terminal. The costs associated with sorting & transfering loads from there trucks R given. Find - optimal asmnt as 2 min^se TC.

Stop \ Truck	1	2	3	4
1	3	6	2	6
2	7	1	4	4
3	3	8	5	8
4	6	4	3	7
5	5	2	4	3
6	5	7	6	2.

Phones


Add 2 dummy columns.
3 6 2 6 0 0
7 1 4 4 0 0
3 8 5 8 0 0
4 3 7 0 0
4 3 0 0
6 2 0 0


① Add rows
3 6 9 6 0 0
7 1 4 4 0 0
3 8 5 8 0 0
6 4 3 7 0 0
5 2 4 3 0 0
5 7 6 2 0 0
② Add columns -
0 5 0 4 0 0
4 0 2 2 0 0
0 7 3 6 0 0
3 3 1 5 0 0
2 1 2 1 0 0
2 6 4 0 0 0
Appointments


③
0 5 0 4 0 0
4 0 2 2 0 0
Phones
0 7 3 6 0 0
3 3 1 5 0 0
2 1 2 1 0 0
2 6 4 0 0 0
optimal sol.
1 — 3 → 2
2 — 2 → 1
3 — 1 → 3
4 — 5 → 0
5 — 6 → 0
6 — 4 → 2
Rs. 8

Restricted / Prohibited Asnmts.

Work to do

⇒ B'cos of legal / other restrictions - asnmt of certain resources 2 some activities is not permitted.

⇒ In such cases, the cost of perf^g that partl. activity by a partl. resource is cstd 2 B V. large (M or ∝) so as 2 prohibit - entry of this pair of res - activity in 2 - final sol.

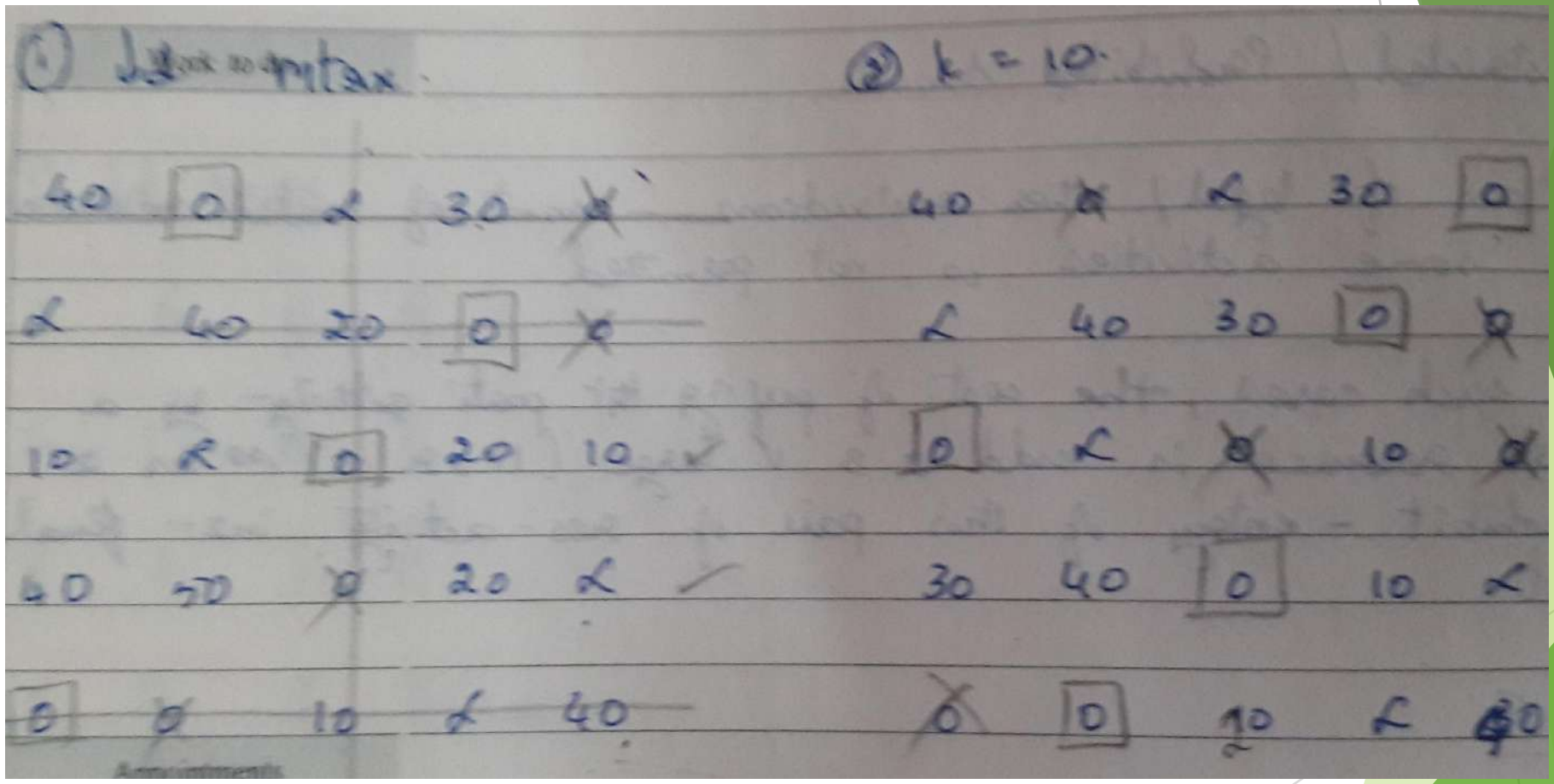
A metal wks co. has 5 jobs & 6 machi. 2 do them. Some machines do not suit - job req/mt & hence the jobs cannot B assigned 2 them. These R shown as X in - table. Assign - jobs 2 - machi. with this - given restrictions so as 2 minimise TC

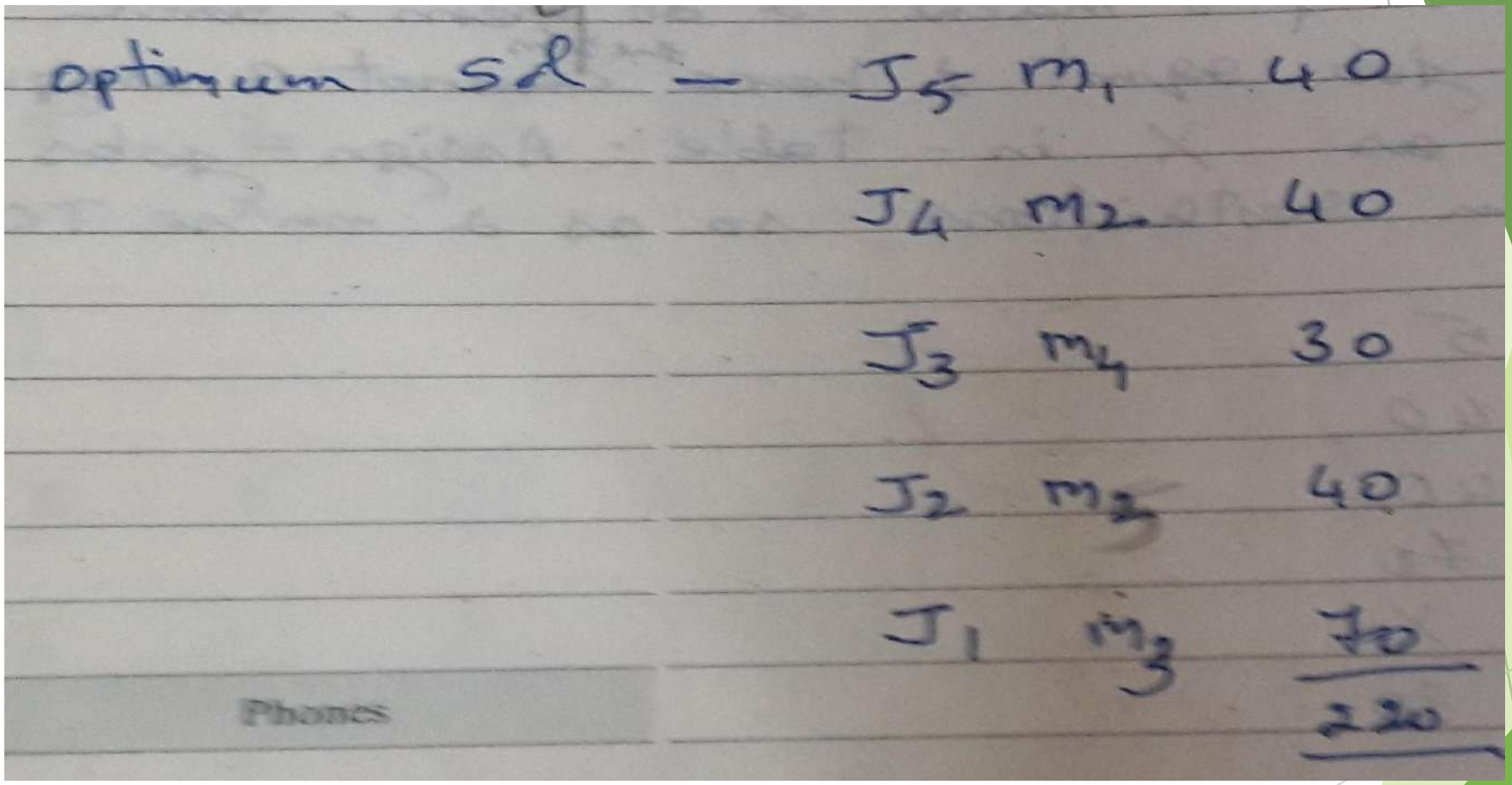
	Jobs				
Machi	1	2	3	4	5
1	80	40	X	70	40
2	X	80	60	40	40
3	70	X	60	80	70
4	70	80	30	50	X
5	40	40	50	X	80

.

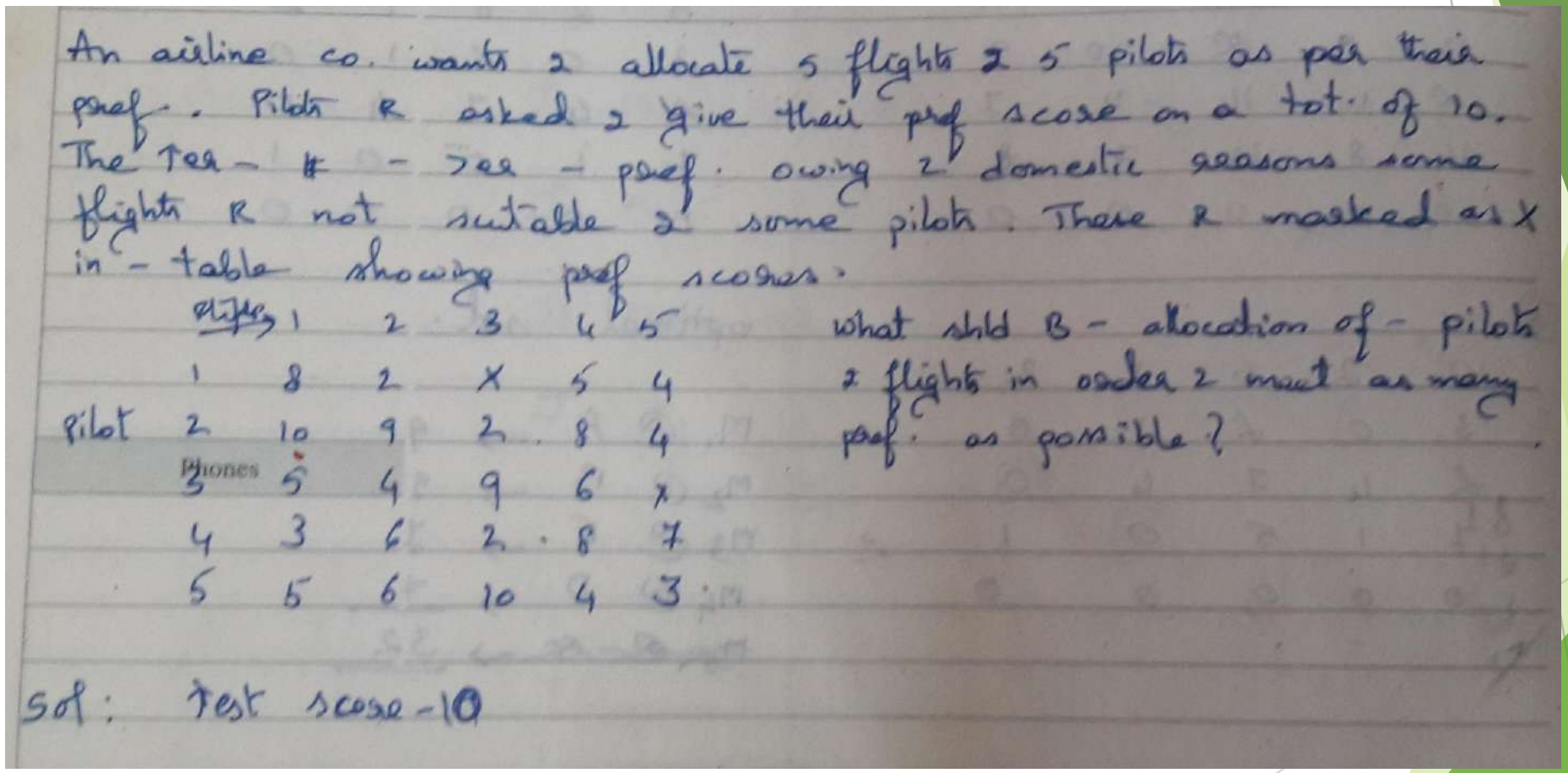
Sol.

80	40	M	70	40
M	80	60	40	40
70	M	60	80	70
70	80	30	50	M
40	40	50	M	80


① Algorithm
40 0 x 30
x 40 20 0
10 x 0 20 10
40 20 0 20 x
0 0 10 x 40
② k = 10.
40 0 x 30 0
x 40 30 0 0
0 x 0 10 0
30 40 0 10 x
0 0 10 x 40


optimum sol —
J_5 m_1 40
J_4 m_2 40
J_3 m_4 30
J_2 m_5 40
J_1 m_3 70
220
Phones

Maximization in AP

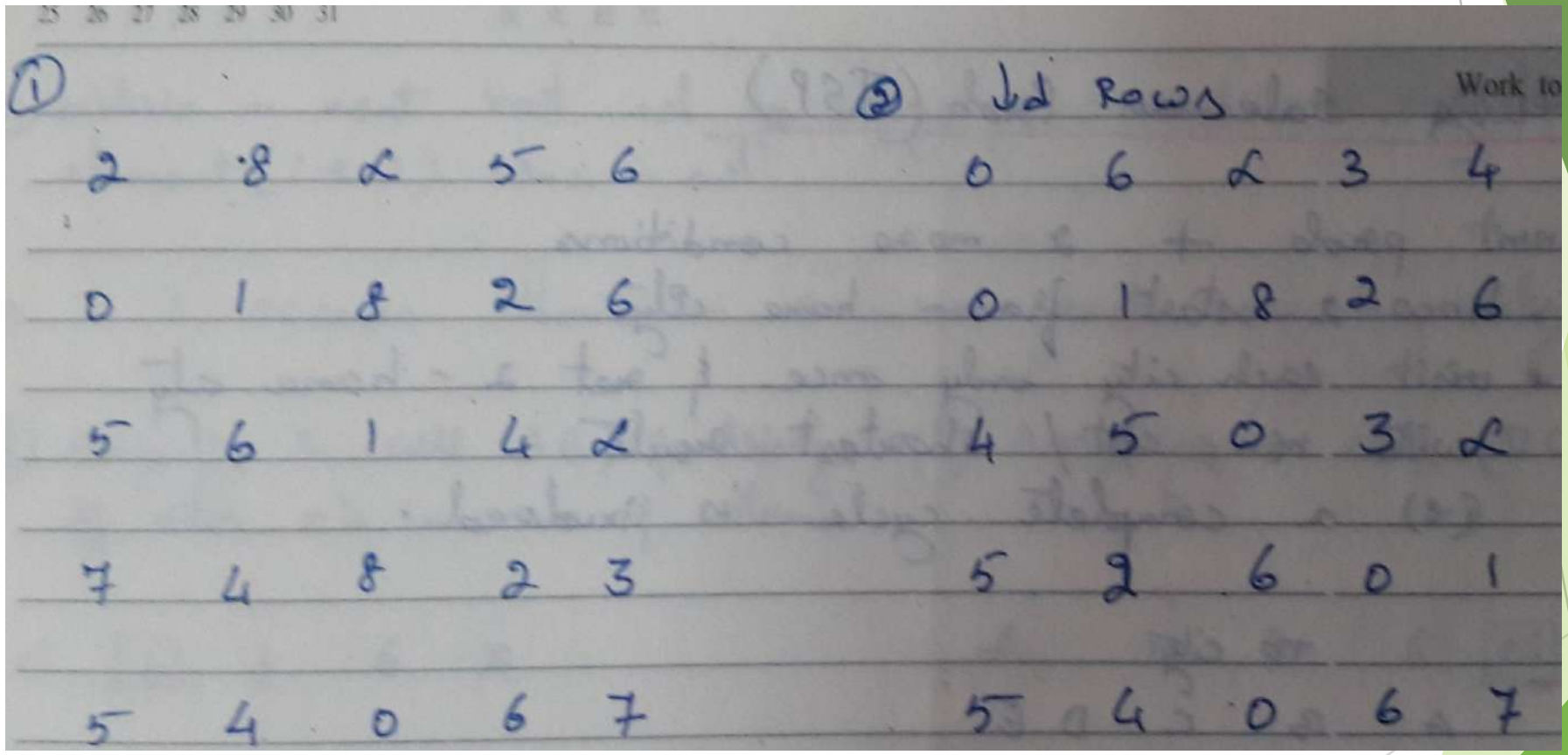


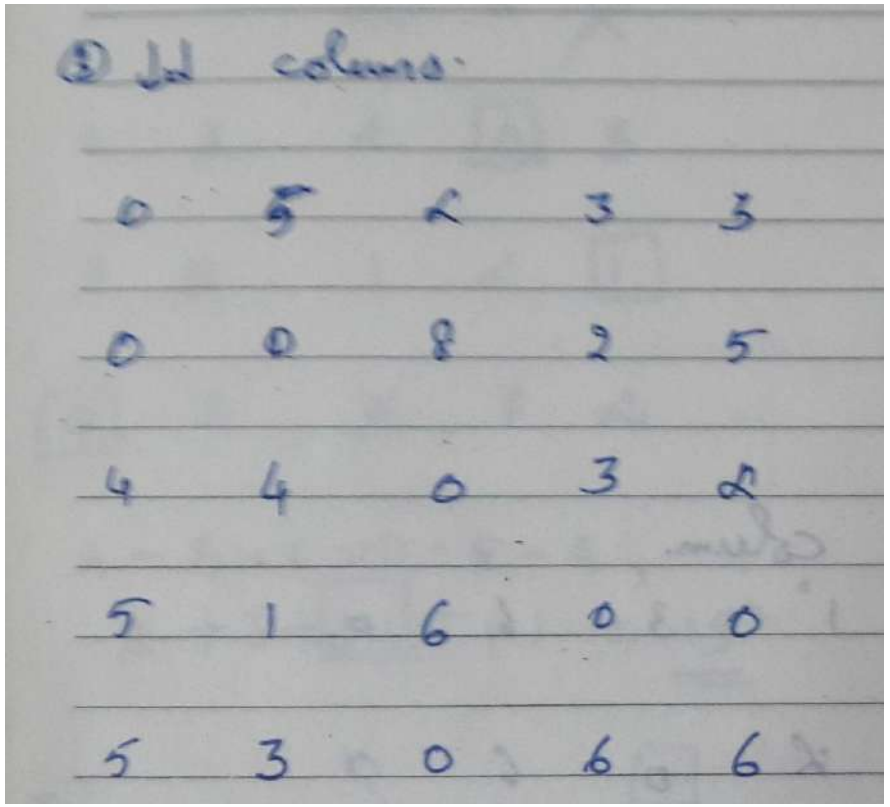
An airline co. wants 2 allocate 5 flights 2 5 pilots as per their pref. Pilots R asked 2 give their pref score on a tot. of 10. The Tea - # - Tea - pref. owing 2 domestic reasons some flights R not suitable 2 some pilots. These R marked as X in - table showing pref scores.

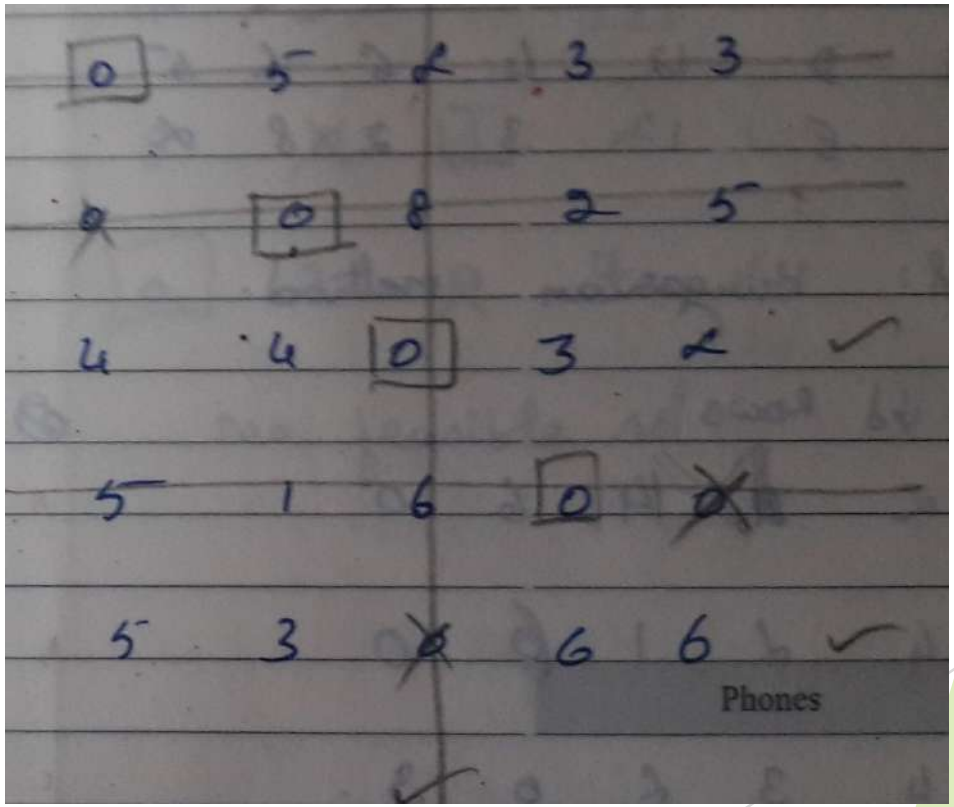
Flights →	1	2	3	4	5
Pilot 1	8	2	X	5	4
Pilot 2	10	9	2	8	4
Pilot 3	5	4	9	6	X
Pilot 4	3	6	2	8	7
Pilot 5	5	6	10	4	3

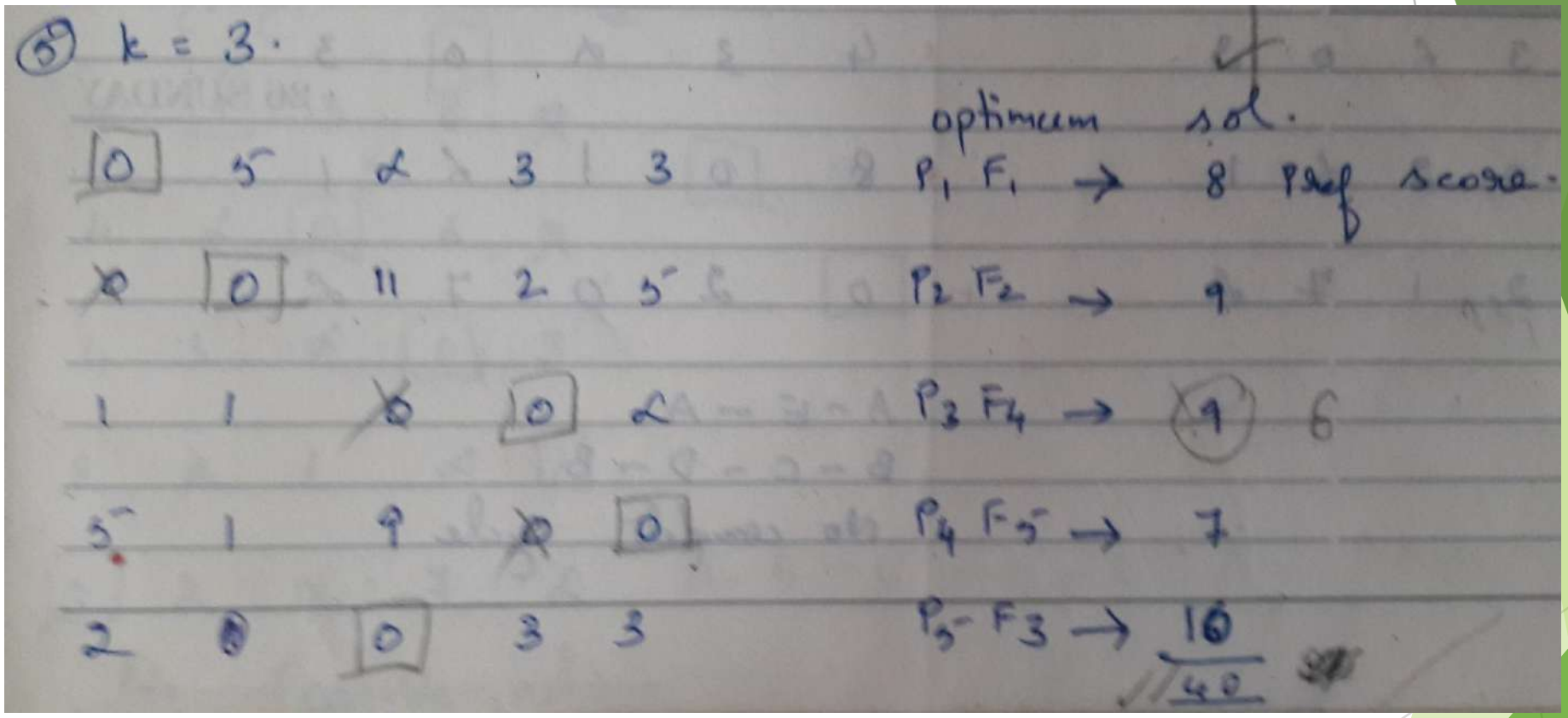
what shld B - allocation of - pilots 2 flights in order 2 must as many pref. as possible?

Sol: Test score - 10


①
2 8 2 5 6
0 1 8 2 6
5 6 1 4 2
7 4 8 2 3
5 4 0 6 7
②
Add Rows
0 6 2 3 4
0 1 8 2 6
4 5 0 3 2
5 2 6 0 1
5 4 0 6 7


④ 1st column.
0 5 2 3 3
0 0 8 2 5
4 4 0 3 2
5 1 6 0 0
5 3 0 6 6


0 5 2 3 3
0 0 8 2 5
4 4 0 3 2
5 1 6 0 0
5 3 0 6 6
Phones


(5) k = 3.
optimum sol.
0 5 2 3 3 P1 F1 → 8 Pref score.
0 11 2 5 P2 F2 → 9
1 1 0 0 2 P3 F4 → 9 6
5 1 9 0 P4 F5 → 7
2 0 3 3 P5 F3 → 10
40

Travelling Salesman Prob (TSP)

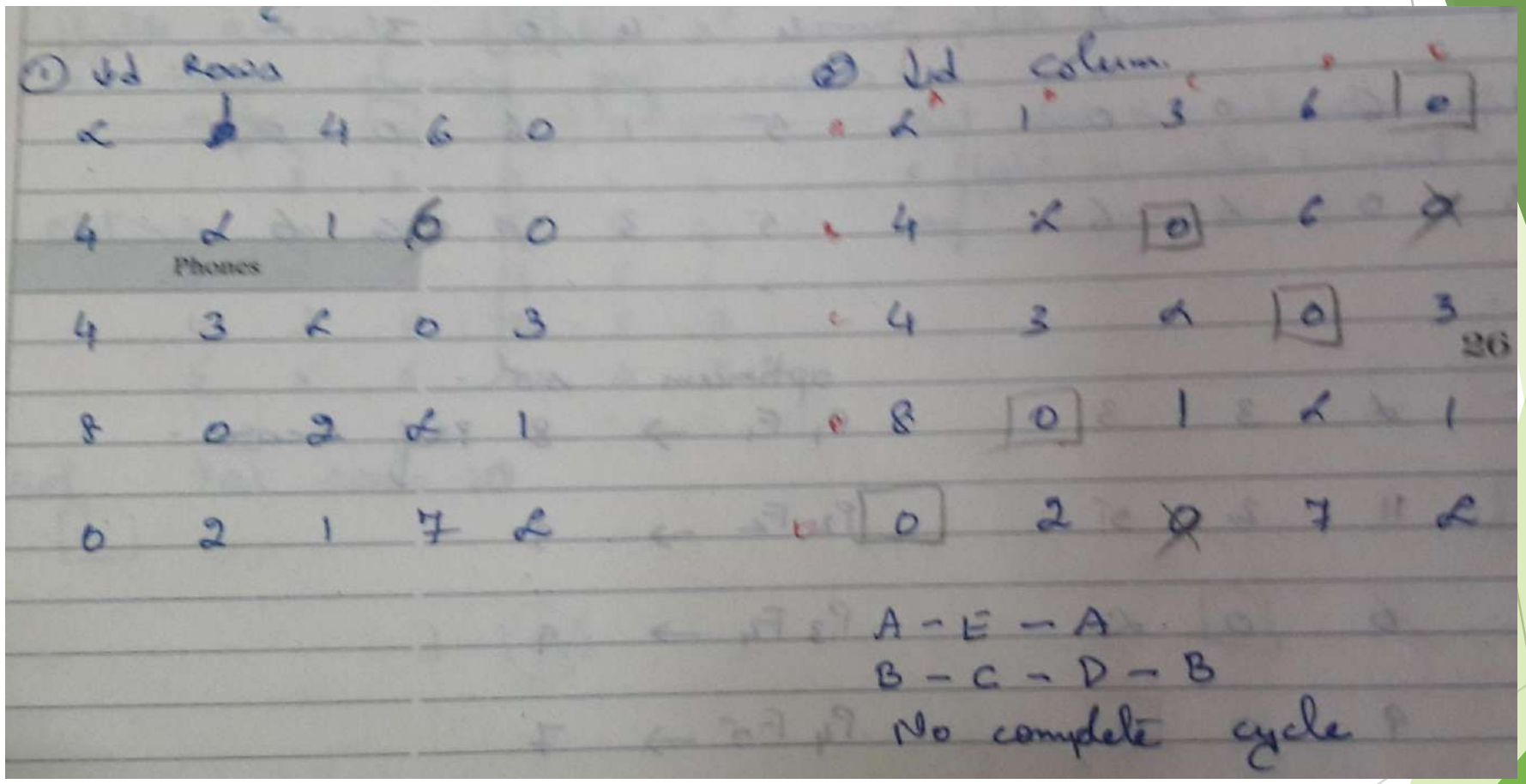
→ N asmnt prob + 2 more conditions

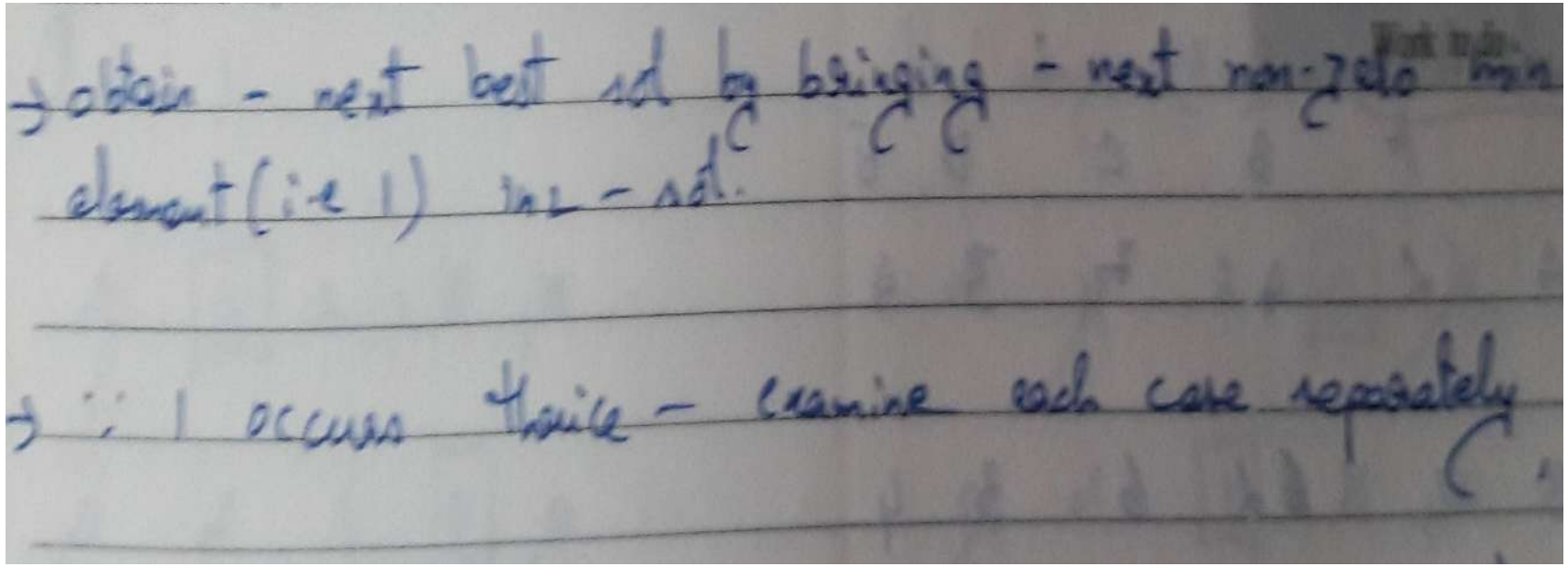
- have 2 start from - home city
- visit each city only once & ret 2 - home city with min. cost / shortest route

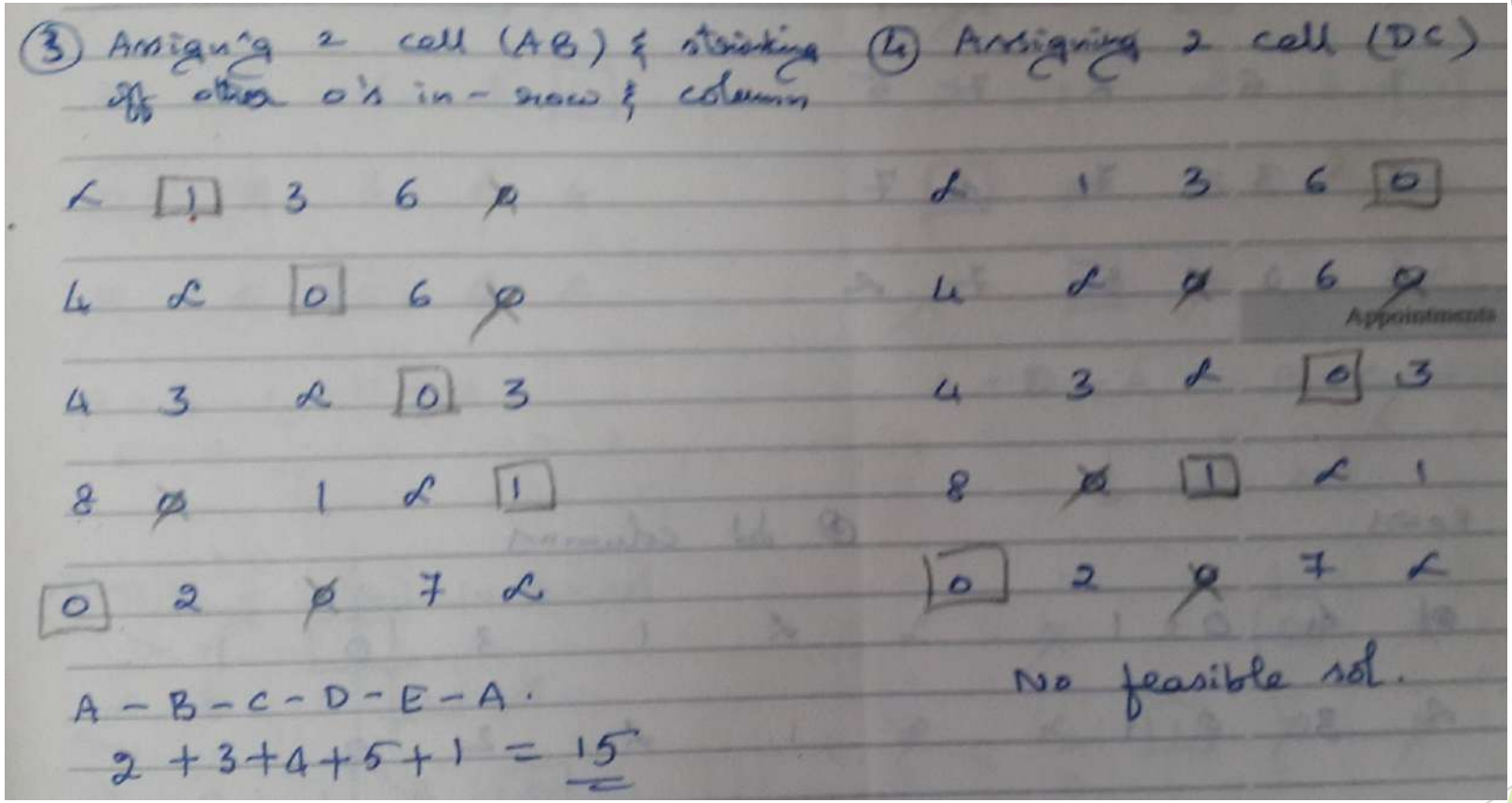
(i.e) a complete cycle is involved.

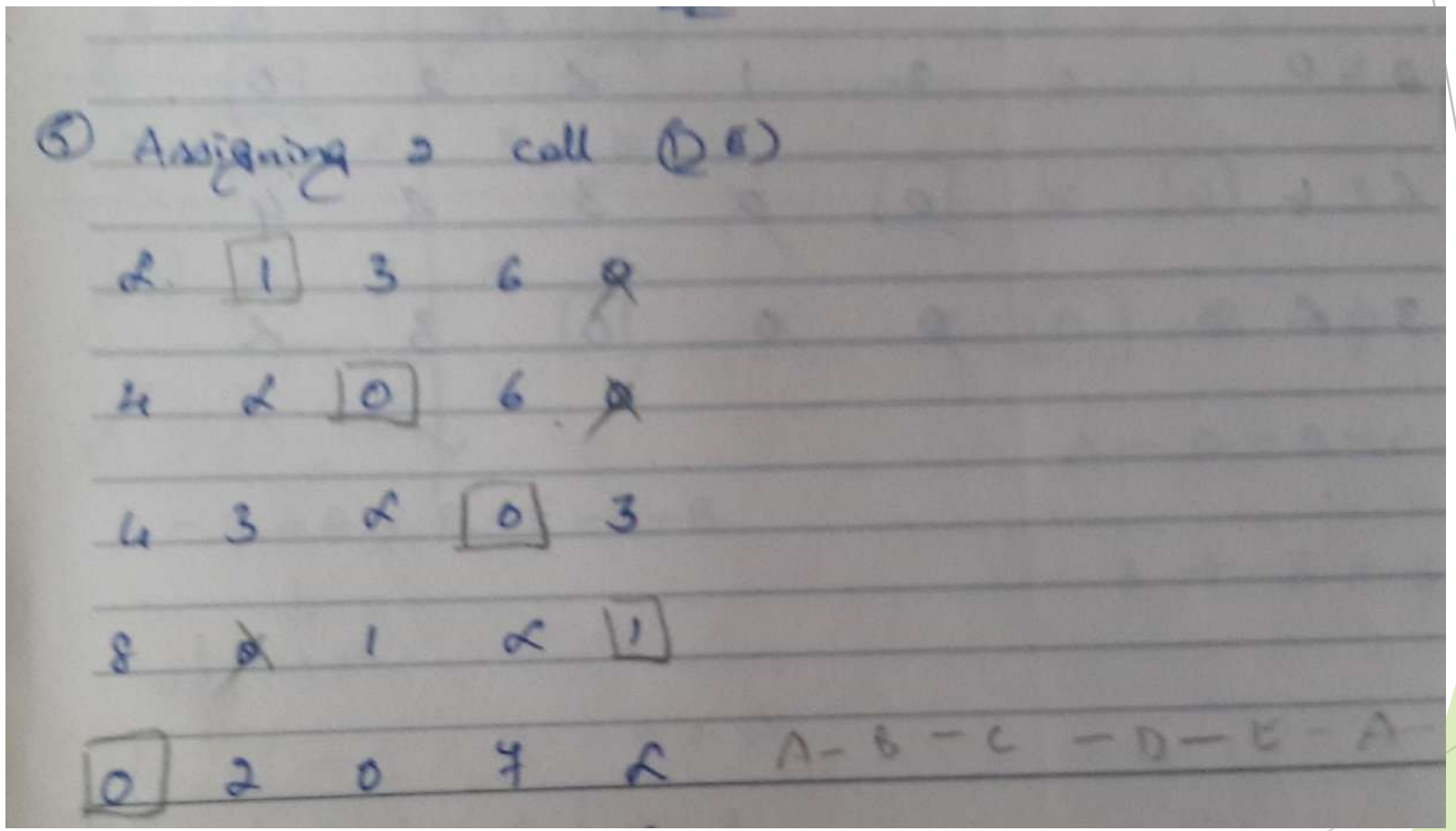
Prob 8:

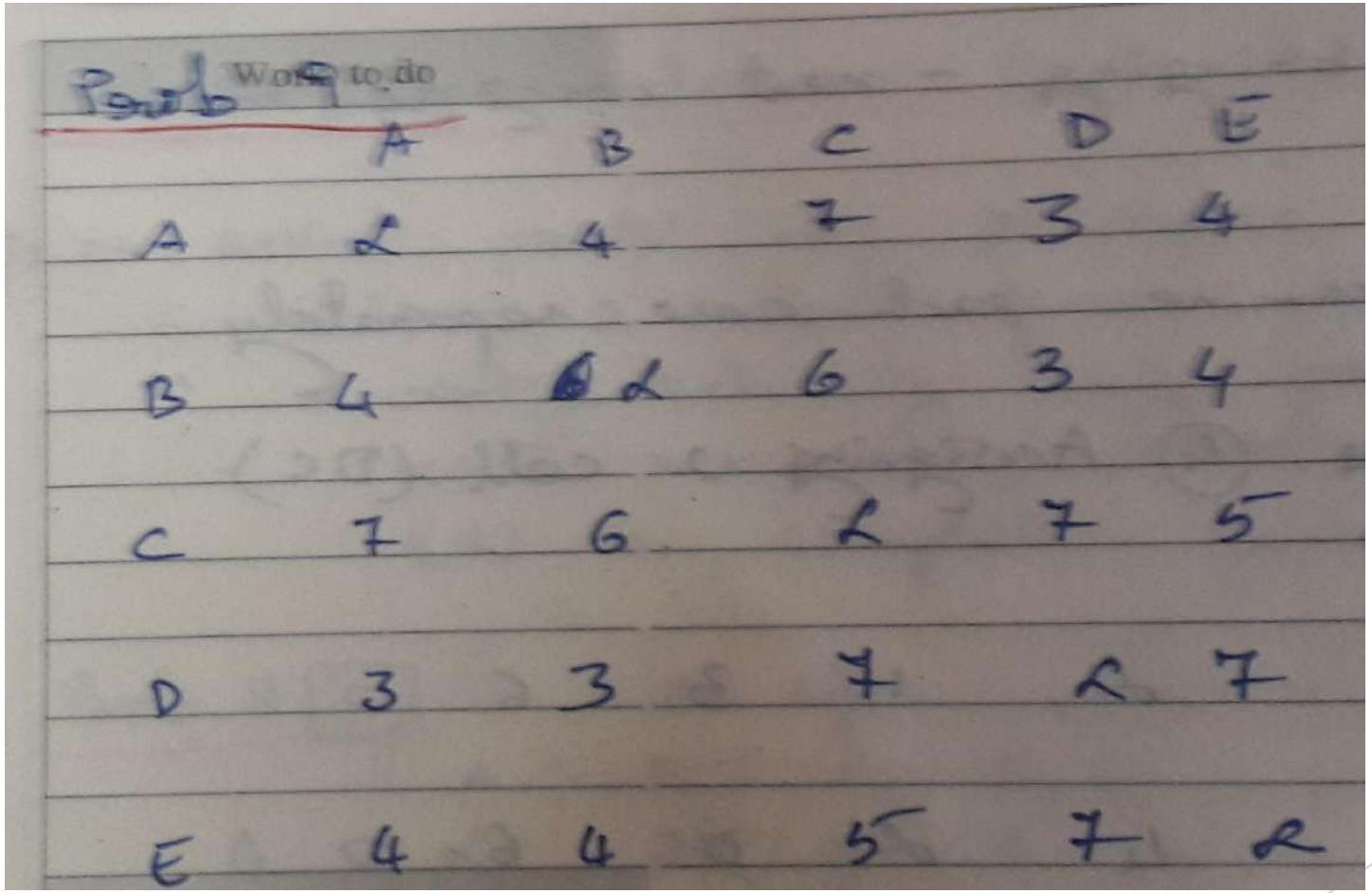
From City \ To city	A	B	C	D	E
A	∞	2	5	7	1
B	6	∞	3	8	2
C	8	7	∞	4	7
D	12	4	6	∞	5
E	1	3	2	8	∞


① Id Rows
2 1 4 6 0
4 2 1 6 0
4 3 2 0 3
8 0 2 2 1
0 2 1 7 2
② Id colum
2 1 3 6 0
4 2 0 6 2
4 3 2 0 3
8 0 1 2 1
0 2 2 7 2
A - E - A
B - C - D - B
No complete cycle


→ obtain - next best sol by bringing - next non-zero basic
element (i.e 1) in L - sol.
→ ; 1 occurs thrice - examine each case seperately


(3) Assigning 2 cell (AB) & striking off other 0's in - row & column
∞ [1] 3 6 ∞
4 ∞ [0] 6 ∞
4 3 ∞ [0] 3
8 ∞ 1 ∞ [1]
[0] 2 ∞ 7 ∞
A - B - C - D - E - A.
2 + 3 + 4 + 5 + 1 = 15
(4) Assigning 2 cell (DC)
∞ 1 3 6 [0]
4 ∞ ∞ 6 ∞
4 3 ∞ [0] 3
8 ∞ [1] ∞ 1
[0] 2 ∞ 7 ∞
No feasible sol.


⑤ Assigning → call (D E)
2 1 3 6 9
4 2 0 6 9
4 3 2 0 3
8 9 1 2 1
0 2 0 7 2
A - B - C - D - E - A


Work to do
A B C D E
A 2 4 7 3 4
B 4 6 2 6 3 4
C 7 6 2 7 5
D 3 3 7 2 7
E 4 4 5 7 2