


Homework 5 : Sorting

Corrupt Hospital

CS2351 Data Structures, 2024 Spring

Responsible for Homework 5: 許木羽



Session 0 Orientation Handout

page 9

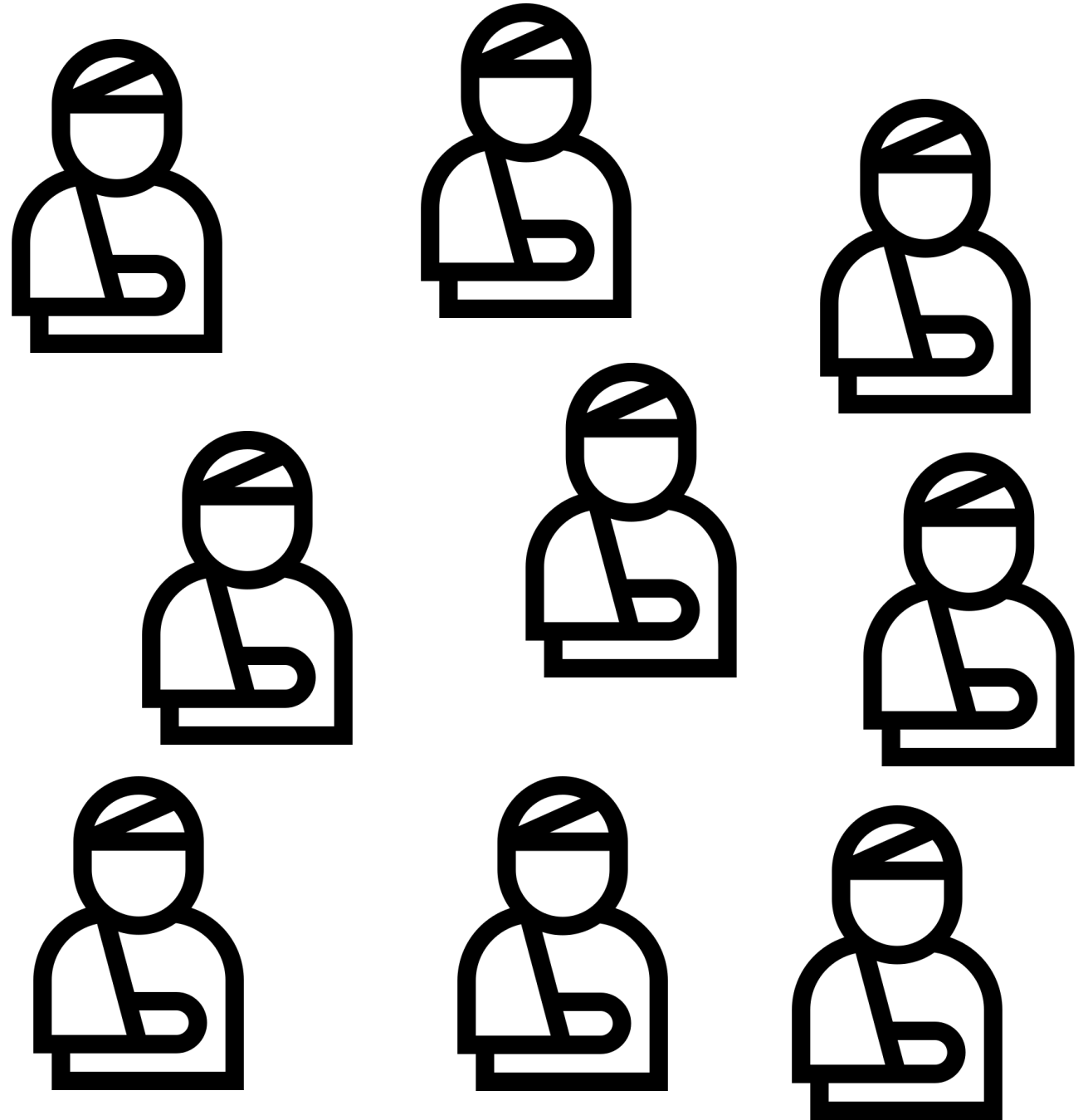
Activities

- Orientation quiz for deciding the grading policy
 - Should taken before 2/26/2024
- Several previewing quizzes
- Five assignments
 - Pick the highest four
- Five Online Judge quizzes
 - Pick the highest four
- Two closed-book exams
 - You can bring one A4 page paper

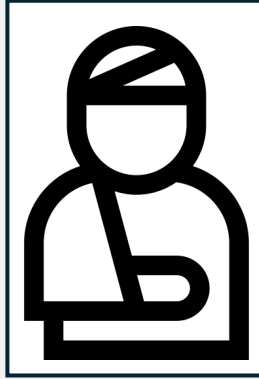


One day a disaster
occur in your city

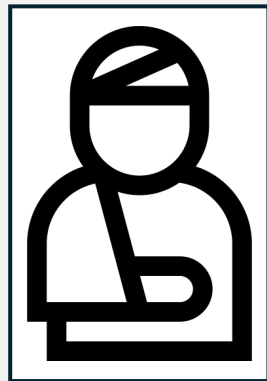
Many casualties
need to be
treated



Patient Information

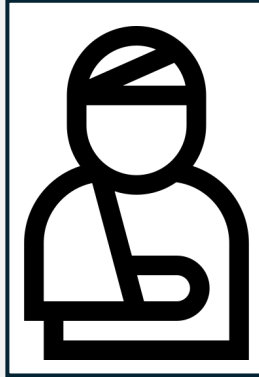


Name	: Andrew Drew
Age	: 45
Money	: 30000
Membership	: 1
Join Date	: 2020-03-23

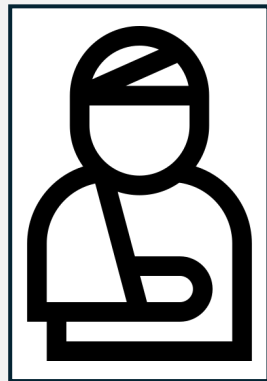


Name	: Barney Don Jr.
Age	: 94
Money	: 23300
Membership	: 0
Join Date	: NaN

Patient Information

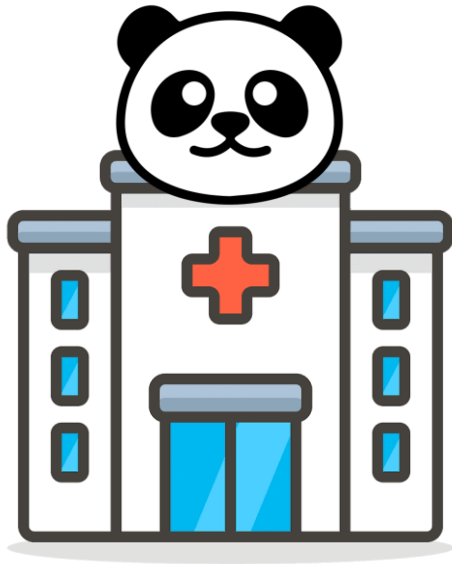


Name : Andrew Drew
Age : 45
Money : 30000
Membership : 1
Join Date : 2020-03-23



Name : Barney Don Jr.
Age : 94
Money : 23300
Membership : 0
Join Date : NaN

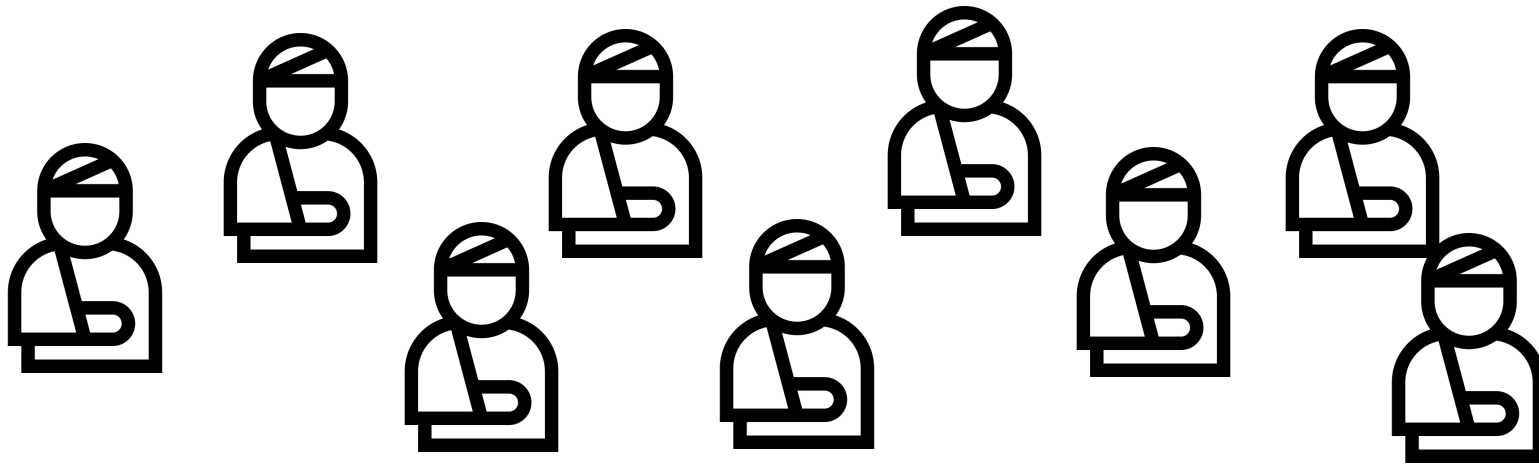
No membership automatically NaN and it's guaranteed

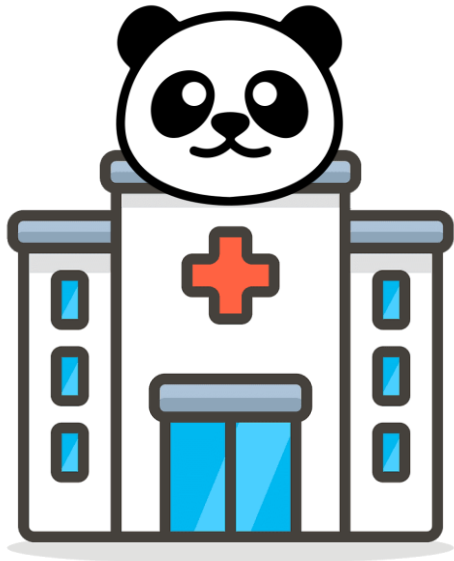


Panda Hospital



Bear Hospital

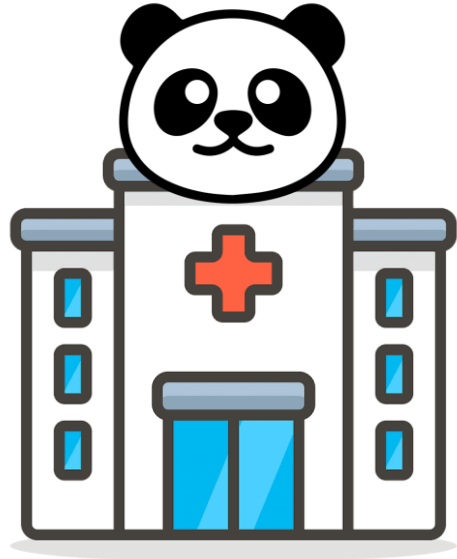




Panda Hospital

Panda Hospital Priority from Highest to Lowest

1. People with hospital membership
2. Longest to shortest membership
3. Name in alphabetical order
4. Input order

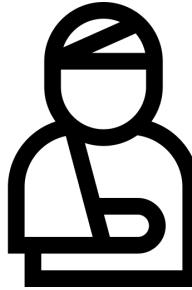


Panda Hospital

Panda Hospital Priority from Highest to Lowest

1. People with hospital membership
2. Longest to shortest membership
3. Name in alphabetical order
4. Input order

Example #1:

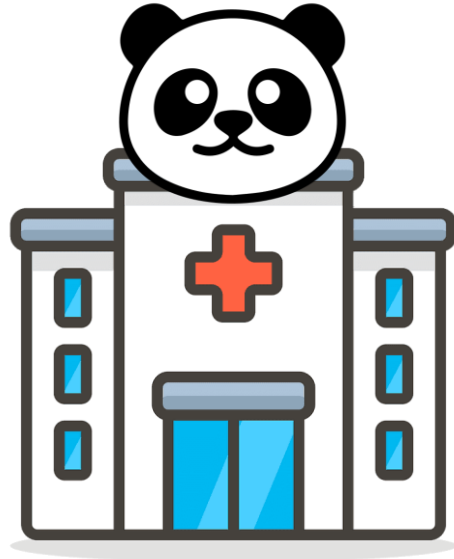


Name	: Andrew Drew
Age	: 45
Money	: 30000
Membership	: 1
Join Date	: 2020-03-23



Name	: Barney Don Jr.
Age	: 94
Money	: 23300
Membership	: 0
Join Date	: NaN

**More
Priority**

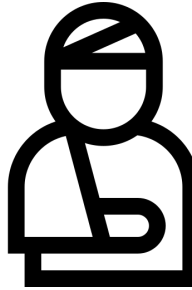


Panda Hospital

Panda Hospital Priority from Highest to Lowest

1. People with hospital membership
2. Longest to shortest membership
3. Name in alphabetical order
4. Input order

Example #2:

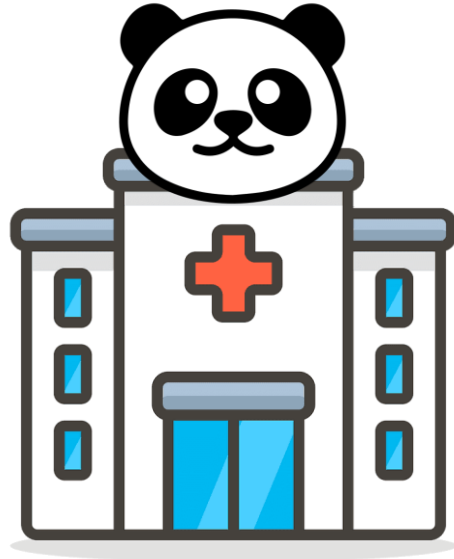


Name	: Andrew Drew
Age	: 45
Money	: 30000
Membership	: 1
Join Date	: 2020-03-23



Name	: Cindy Berau
Age	: 33
Money	: 23300
Membership	: 1
Join Date	: 2018-01-17

**More
Priority**

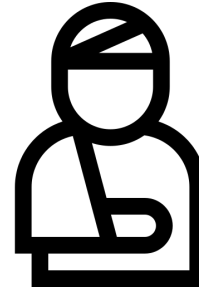


Panda Hospital

Panda Hospital Priority from Highest to Lowest

1. People with hospital membership
2. Longest to shortest membership
3. Name in alphabetical order
4. Input order

Example #3:

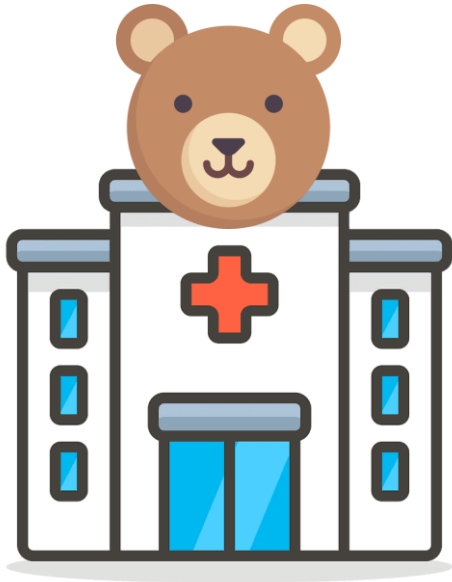


Name	: Andrew Drew
Age	: 45
Money	: 30000
Membership	: 1
Join Date	: 2020-03-23



Name	: Zebra Jhon
Age	: 33
Money	: 25300
Membership	: 1
Join Date	: 2020-03-23

**More
Priority**



Bear Hospital

Bear Hospital Priority from Highest to Lowest

1. Highest amount of money
2. Input order

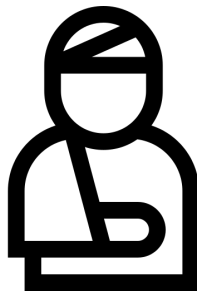


Bear Hospital

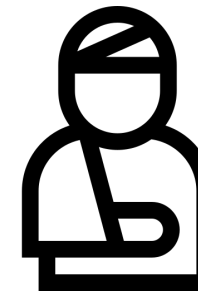
Bear Hospital Priority from Highest to Lowest

1. Highest amount of money
2. Input order

Example:



Name	: Peter Carti
Age	: 33
Money	: 100000
Membership	: 0
Join Date	: NaN



Name	: John Kool
Age	: 22
Money	: 20
Membership	: 1
Join Date	: 2020-03-05



Input Order Example

Example Input:

3 1

John Kool

22 300 1 2020-03-05

John Kool

59 2000 0 NaN

John Kool

37 100 1 2020-03-05

1 0 0

John Kool

37 40000 0 NaN

Input Order Example

Example Input:

3 1

John Kool
22 300 1 2020-03-05

John Kool
59 2000 0 NaN

John Kool
37 100 1 2020-03-05

1 0 0

John Kool
44 40000 0 NaN

Name : John Kool
Age : 22
Money : 300
Membership : 1
Join Date : 2020-03-05

Name : John Kool
Age : 37
Money : 100
Membership : 1
Join Date : 2020-03-05

Name : John Kool
Age : 59
Money : 2000
Membership : 0
Join Date : NaN

Name : John Kool
Age : 44
Money : 40000
Membership : 0
Join Date : NaN

Input Order Example

Based on Panda Hospital policies, sorted list will be

Name	: John Kool
Age	: 22
Money	: 300
Membership	: 1
Join Date	: 2020-03-05

1

Name	: John Kool
Age	: 37
Money	: 100
Membership	: 1
Join Date	: 2020-03-05

2

Name	: John Kool
Age	: 59
Money	: 2000
Membership	: 0
Join Date	: NaN

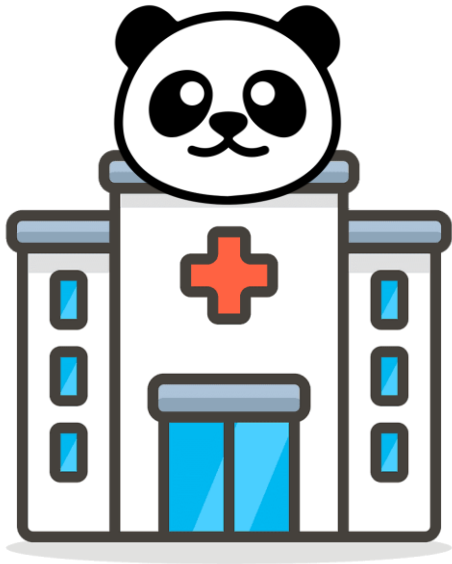
3

Name	: John Kool
Age	: 44
Money	: 40000
Membership	: 0
Join Date	: NaN

4

Panda Hospital Priority from Highest to Lowest

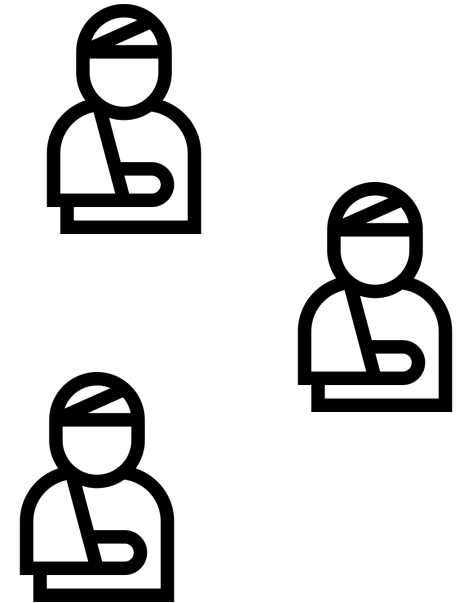
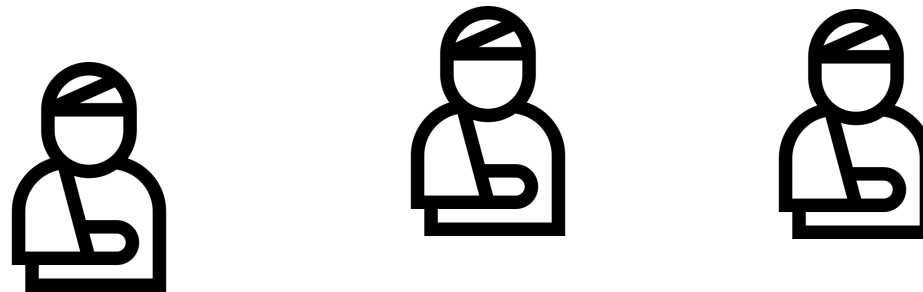
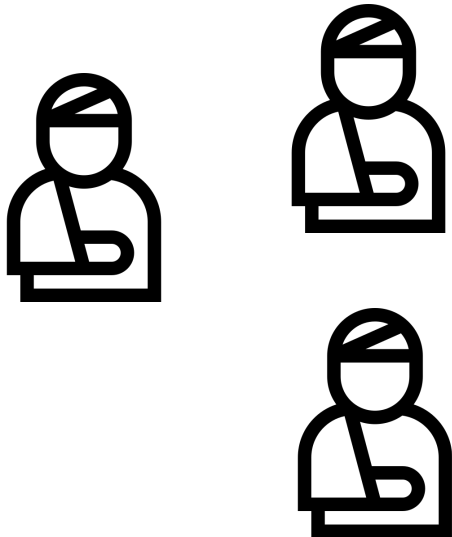
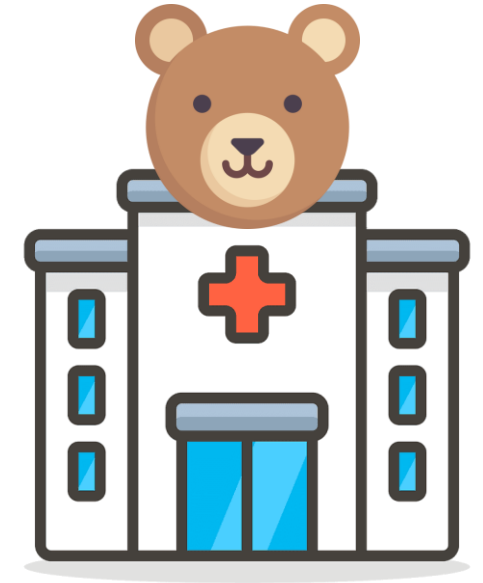
1. People with hospital membership
2. Longest to shortest membership
3. Name in alphabetical order
4. Input order



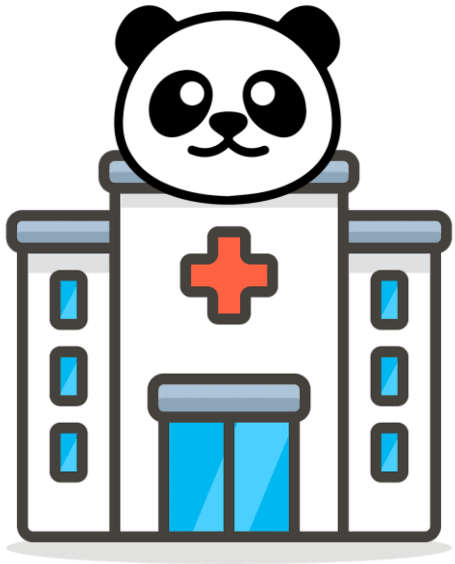
There are M days, on i^{th} day:

Panda Hospital can only treat the first X_i most prioritized patients with Panda Hospital priorities policies

After that Bear Hospital can treat the next K_i most prioritized patients with Bear Hospital priorities

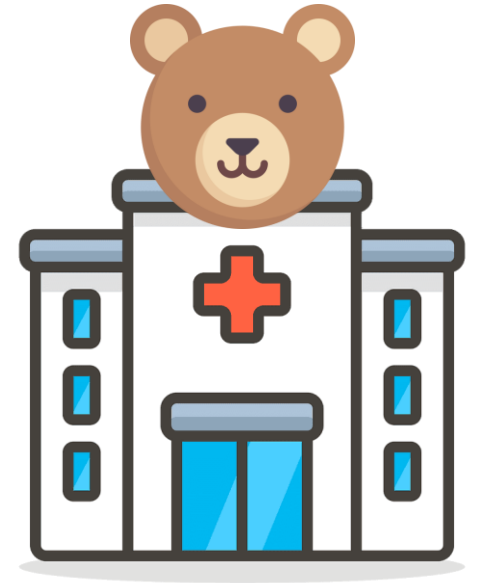


More explanation in next slides
(sample input & output explanation)

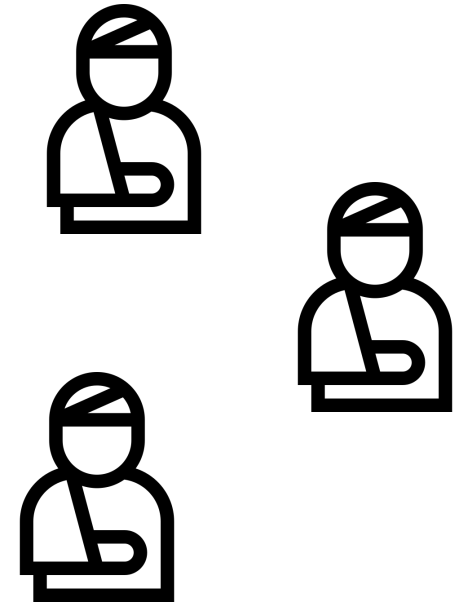
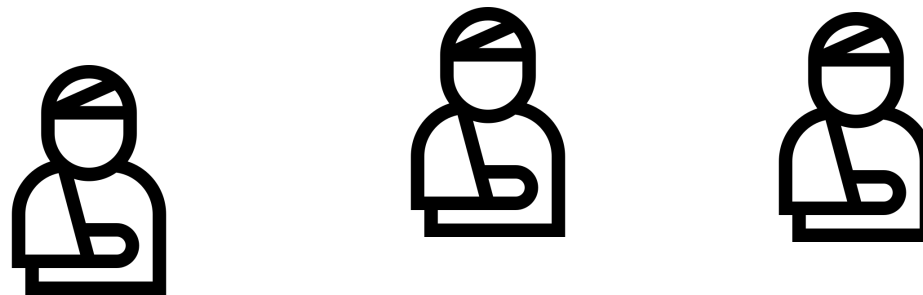
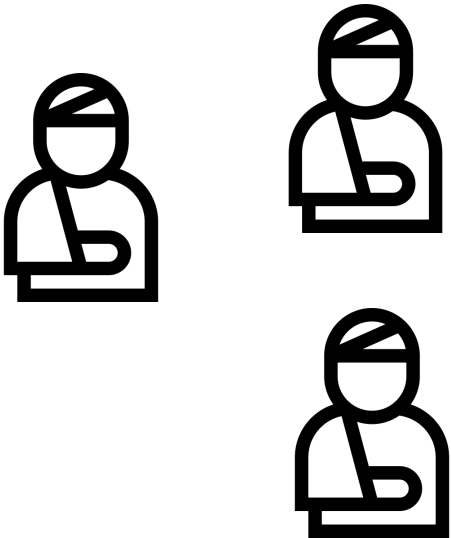


Each day we need to print all treated patients in Panda Hospital in sorted order (based on Panda Hospital policies) and print their income at that day

Income is counted from all treated patient's money * 90%



Don't worry about floating point, the number of money is multiplier of 10



More explanation in next slides
(sample input & output explanation)

Input

The first line will be integers N and M ($1 \leq N \leq 2000$ and $1 \leq M \leq 100$)

The next $2 * N$ lines will be the raw data, each 2 lines have:

- first line contains full name of the patient
- second line contains the input below, separated by spaces:
 - age ($0 \leq \text{age} \leq 100$)
 - money ($10 \leq \text{money} \leq 10^6$) (guarantee multiples of 10 to avoid floating error)
 - hospital membership (1 if a member, 0 if not)
 - Membership Join Date (Format: “YYYY-MM-DD” or it’s guarantee “NaN” if they are not member)

The next $2 * M$ lines contain following input, from the first day until the M-th day:

- First line contains Integer P X K ($0 \leq P \leq 1000$, $0 \leq (X, K) < 2^{31}$)
- Next $2 * P$ lines contain list of people who will be added to the list, each 2 lines have:
 - first line contains full name of the patient.
 - second line contains below input, separated by spaces:
 - age ($0 \leq \text{age} \leq 100$)
 - money ($10 \leq \text{money} \leq 10^6$) (guarantee multiples of 10)
 - hospital membership (1 if a member, 0 if not)
 - Membership Join Date (Format: YYYY-MM-DD and could be “NaN”)

The total number of patients in 1 day will not exceed 100000.

```
9 4                                → N M
Gerraldo Chandra
55 40000 0 NaN
Vivian
20 100000 1 2018-03-12
Prof. Chen Yi Shin
19 999999 1 2020-06-13
Kuan Hao Yeh
24 200000 0 NaN
Arthur
30 40500 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0                                → P1 X1 K1 (Since P1=0 there will be no new patients)
10 6 6                                → P2 X2 K2
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1                                → P3 X3 K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300                            → P4 X4 K4
```

2 * N lines of N patients

2 * P₂ lines of N patients

2 * P₃ lines of N patients

Output

For each day, first line print “DAY #X” for day X, and next line print out sorted list of treated patients (in Panda Hospital) name and age separated by space, each patient separated by new line, and the end of the list print the income of Panda Hospital at that day with format “INCOME TODAY: Y” for Y income. (refers to sample output)

If there is no one to print (e.g. today list is empty) don't print anything and set income to 0.

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
DAY #3
INCOME TODAY: 0
DAY #4
Red Version Ultraman 200
Mr. Meow 22
INCOME TODAY: 1809
```

Day 1

Day 2

Day 3

Day 4

Input

The first line will be integers N and M ($1 \leq N \leq 2000$ and $1 \leq M \leq 100$)

The next $2 * N$ lines will be the raw data, each 2 lines have:

- first line contains full name of the patient
- second line contains the input below, separated by spaces:
 - age ($0 \leq \text{age} \leq 100$)
 - money ($10 \leq \text{money} \leq 10^6$) (guarantee multiples of 10 to avoid floating error)
 - hospital membership (1 if a member, 0 if not)
 - Membership Join Date (Format: “YYYY-MM-DD” or it’s guarantee “NaN” if they are not member)

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 - first line contains full name of the patient.
 - second line contains below input, separated by spaces:
 - age ($0 \leq \text{age} \leq 100$)
 - money ($10 \leq \text{money} \leq 10^6$) (guarantee multiples of 10)
 - hospital membership (1 if a member, 0 if not)
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The total number of patients in 1 day will not exceed 100000.

```
9 4                                → N M
Gerraldo Chandra
55 40000 0 NaN
Vivian
20 100000 1 2018-03-12
Prof. Chen Yi Shin
19 999999 1 2020-06-13
Kuan Hao Yeh
24 200000 0 NaN
Arthur
30 40500 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0                                → P1 X1 K1 (Since P1=0 there will be no new patients)
10 6 6                                → P2 X2 K2
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1                                → P3 X3 K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300                            → P4 X4 K4
```

2 * N lines of N patients

2 * P₂ lines of N patients

2 * P₃ lines of N patients

INITIALIZE

There is N patients and M days in total

Add all N patients to the list,

Here N is 9

And here we are managing from day 1 to day 4

Output

Current List

1. *Gerraldo Chandra*
2. *Vivian*
3. *Prof. Chen Yi Shin*
4. *Kuan Hao Yeh*
5. *Arthur*
6. *Nguyen Dang Hoang Khang*
7. *Achita Kenjiiii*
8. *Aurick Daniel*
9. *Angelina Panyananda*

9 4

Gerraldo Chandra

55 40000 0 NaN

Vivian

20 100000 1 2018-03-12

Prof. Chen Yi Shin

19 999999 1 2020-06-13

Kuan Hao Yeh

24 200000 0 NaN

Arthur

30 40500 1 1999-08-29

Nguyen Dang Hoang Khang

17 60000 0 NaN

Achita Kenjiiii

5 700000 1 2020-08-22

Aurick Daniel

45 2000 0 NaN

Angelina Panyananda

11 20200 1 2022-01-01

0 5 0

10 6 6

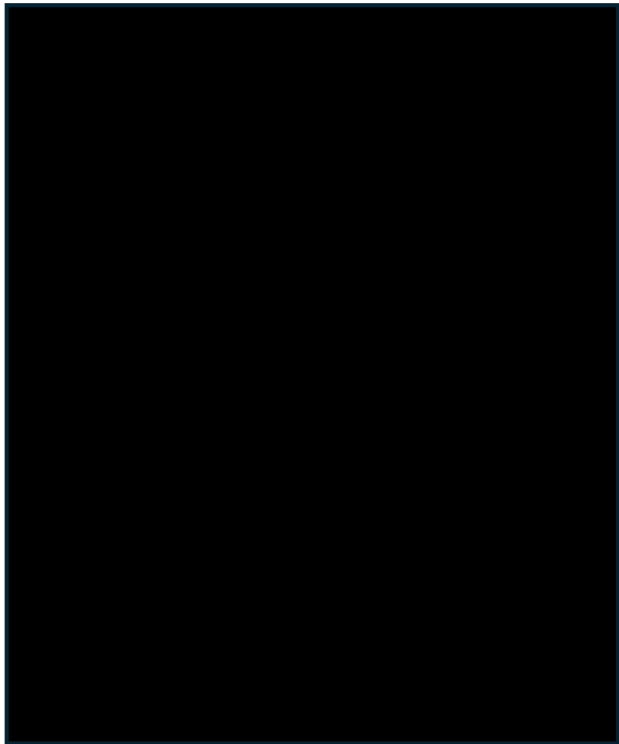
DAY #1

Step 1

Add new patients to the list

But P here is 0, so are not adding anything to the list

Output



Current List

- 1. *Gerraldo Chandra*
- 2. *Vivian*
- 3. *Prof. Chen Yi Shin*
- 4. *Kuan Hao Yeh*
- 5. *Arthur*
- 6. *Nguyen Dang Hoang Khang*
- 7. *Achita Kenjiiii*
- 8. *Aurick Daniel*
- 9. *Angelina Panyananda*

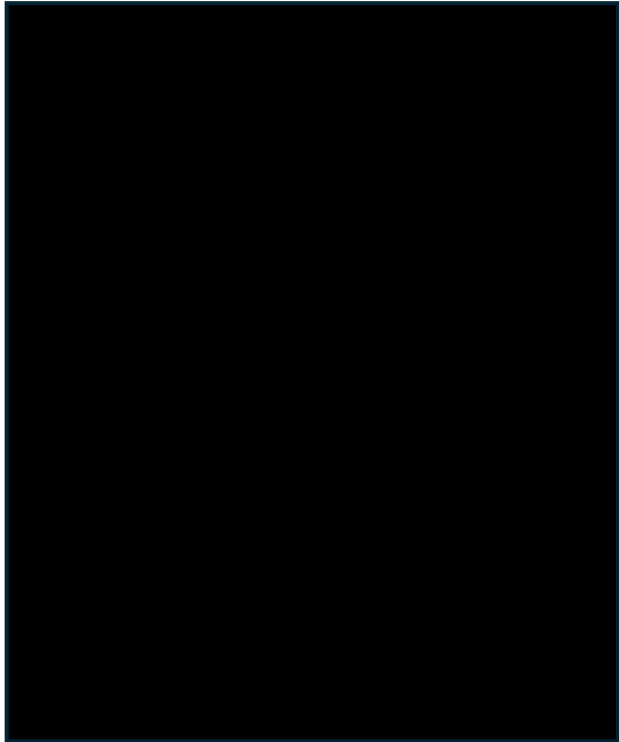
30 40000 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0 $P_1 X_1 K_1$
10 6 6
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow

DAY #1

Step 2

Sort it based on Panda Hospital policies

Output



Current List (with age)

- 1. Arthur (30)
- 2. Vivian (20)
- 3. Prof. Chen Yi Shin (19)
- 4. Achita Kenjiiii (5)
- 5. Angelina Panyananda (11)
- 6. Aurick Daniel (45)
- 7. Gerraldo Chandra (55)
- 8. Kuan Hao Yeh (24)
- 9. Nguyen Dang Hoang Khang (17)

30 40300 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0 $P_1 X_1 K_1$
10 6 6
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow

DAY #1

Step 3

Print first X_1 and remove it from the list

Here X_1 is 5, so we need to print the first 5 and remove it

After that print the Income in that day

Current List (with age)

1. *Aurick Daniel (45)*
2. *Gerraldo Chandra (55)*
3. *Kuan Hao Yeh (24)*
4. *Nguyen Dang Hoang Khang (17)*

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
```

```
30 40000 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20000 1 2022-01-01
0 5 0  $P_1 X_1 K_1$ 
10 6 6
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
```

DAY #1

Step 4

Sort based on Bear Hospital policies

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
```

- Current List (with age)**
- 1. *Kuan Hao Yeh (24)*
 - 2. *Nguyen Dang Hoang Khang (17)*
 - 3. *Gerraldo Chandra (55)*
 - 4. *Aurick Daniel (45)*

```
30 40300 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0 P1 X1 K1
10 6 6
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
```

DAY #1

Step 5

Remove the first K_1 from the list
However, since it's 0 we don't need to do anything here

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
```

- Current List (with age)**
- 1. Kuan Hao Yeh (24)
 - 2. Nguyen Dang Hoang Khang (17)
 - 3. Gerraldo Chandra (55)
 - 4. Aurick Daniel (45)

```
30 40300 1 1999-08-29
Nguyen Dang Hoang Khang
17 60000 0 NaN
Achita Kenjiiii
5 700000 1 2020-08-22
Aurick Daniel
45 2000 0 NaN
Angelina Panyananda
11 20200 1 2022-01-01
0 5 0 P1 X1 K1
10 6 6
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
```

DAY #2

Step 1

Add P_1 patients to the list

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
```

Current List (with age)

- 1. Kuan Hao Yeh (24)
- 2. Nguyen Dang Hoang Khang (17)
- 3. Gerraldo Chandra (55)
- 4. Aurick Daniel (45)
- 5. Mr. Meow (19, 2000, 0, NaN)
- 6. Mr. Meow (17, 2000, 0, NaN)
- 7. Mr. Meow (99, 2000, 1, 2023-12-01)
- 8. Mr. Meow (23, 2000, 0, NaN)
- 9. Mr. Meow (5, 2000, 0, NaN)
- 10. Mr. Meow (16, 2000, 1, 2023-12-01)
- 11. Mr. Meow (35, 2000, 1, 1992-11-23)
- 12. Mr. Meow (22, 2000, 0, NaN)
- 13. Mr. Meow (19, 2000, 1, 2023-12-01)
- 14. Mr. Meow (99, 2000, 1, 1983-03-14)

10	6	6	$P_2 X_2 K_2$
Mr.	Meow		
19	2000	0	NaN
Mr.	Meow		
17	2000	0	NaN
Mr.	Meow		
99	2000	1	2023-12-01
Mr.	Meow		
23	2000	0	NaN
Mr.	Meow		
5	2000	0	NaN
Mr.	Meow		
16	2000	1	2023-12-01
Mr.	Meow		
35	2000	1	1992-11-23
Mr.	Meow		
22	2000	0	NaN
Mr.	Meow		
19	2000	1	2023-12-01
Mr.	Meow		
99	2000	1	1983-03-14

DAY #2

Step 2

Sort based on Pandas Hospital Policies

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
```

Current List (with age)

- 1. Mr. Meow (99 2000 1 1983-3-14)
- 2. Mr. Meow (35 2000 1 1992-11-23)
- 3. Mr. Meow (99 2000 1 2023-12-1)
- 4. Mr. Meow (16 2000 1 2023-12-1)
- 5. Mr. Meow (19 2000 1 2023-12-1)
- 6. Aurick Daniel (45)
- 7. Gerraldo Chandra (55)
- 8. Kuan Hao Yeh (24)
- 9. Mr. Meow (19 2000 0 NaN)
- 10. Mr. Meow (17 2000 0 NaN)
- 11. Mr. Meow (23 2000 0 NaN)
- 12. Mr. Meow (5 2000 0 NaN)
- 13. Mr. Meow (22 2000 0 NaN)
- 14. Nguyen Dang Hoang Khang (17)

10	6	6	P ₂ X ₂ K ₂
Mr.	Meow		
19	2000	0	NaN
Mr.	Meow		
17	2000	0	NaN
Mr.	Meow		
99	2000	1	2023-12-01
Mr.	Meow		
23	2000	0	NaN
Mr.	Meow		
5	2000	0	NaN
Mr.	Meow		
16	2000	1	2023-12-01
Mr.	Meow		
35	2000	1	1992-11-23
Mr.	Meow		
22	2000	0	NaN
Mr.	Meow		
19	2000	1	2023-12-01
Mr.	Meow		
99	2000	1	1983-03-14

DAY #2

Step 3

Print and remove the first X_2 then print the income at that day

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
```

Current List (with age)

1. Gerraldo Chandra (55)
2. Kuan Hao Yeh (24)
3. Mr. Meow (19 2000 0 NaN)
4. Mr. Meow (17 2000 0 NaN)
5. Mr. Meow (23 2000 0 NaN)
6. Mr. Meow (5 2000 0 NaN)
7. Mr. Meow (22 2000 0 NaN)
8. Nguyen Dang Hoang Khang (17)

10 6 6 $P_2 X_2 K_2$

Mr. Meow

19 2000 0 NaN

Mr. Meow

17 2000 0 NaN

Mr. Meow

99 2000 1 2023-12-01

Mr. Meow

23 2000 0 NaN

Mr. Meow

5 2000 0 NaN

Mr. Meow

16 2000 1 2023-12-01

Mr. Meow

35 2000 1 1992-11-23

Mr. Meow

22 2000 0 NaN

Mr. Meow

19 2000 1 2023-12-01

Mr. Meow

99 2000 1 1983-03-14

DAY #2

Step 4

Sorted again based on Bear Hospital Policies

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
```

Current List (with age)

- 1. Kuan Hao Yeh (24)
- 2. Nguyen Dang Hoang Khang (17)
- 3. Gerraldo Chandra (55)
- 4. Mr. Meow (19 2000 0 NaN)
- 5. Mr. Meow (17 2000 0 NaN)
- 6. Mr. Meow (23 2000 0 NaN)
- 7. Mr. Meow (5 2000 0 NaN)
- 8. Mr. Meow (22 2000 0 NaN)

```
10 6 6 P2X2K2
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
```

DAY #2

Step 5

Remove the first K₂ from the lists

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
```

- Current List (with age)
- 1. Mr. Meow (5 2000 0 NaN)
 - 2. Mr. Meow (22 2000 0 NaN)

```
10 6 6 P2X2K2
Mr. Meow
19 2000 0 NaN
Mr. Meow
17 2000 0 NaN
Mr. Meow
99 2000 1 2023-12-01
Mr. Meow
23 2000 0 NaN
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
```


DAY #3

Step 1

Add Patients

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
```

Current List (with age)

1. *Mr. Meow (5 2000 0 NaN)*
2. *Mr. Meow (22 2000 0 NaN)*
3. *Red Version Ultraman*

```
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1 P3X3K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300
```

DAY #3

Step 2

Sort (Pandas Hospital Policies)

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
```

Current List (with age)

- 1. Red Version Ultraman
- 2. Mr. Meow (5 2000 0 NaN)
- 3. Mr. Meow (22 2000 0 NaN)

```
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1 P3X3K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300
```

DAY #3

Step 3

Remove

But here we don't need to remove anything since $X_3 = 0$

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
```

Current List (with age)

- 1. Red Version Ultraman
- 2. Mr. Meow (5 2000 0 NaN)
- 3. Mr. Meow (22 2000 0 NaN)

```
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1 P3X3K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300
```

DAY #3

Step 4

Sort based on Bear Hospital policies

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
```

Current List (with age)

- 1. Mr. Meow (5 2000 0 NaN)
- 2. Mr. Meow (22 2000 0 NaN)
- 3. Red Version Ultraman

```
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1 P3X3K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300
```

DAY #3

Step 5

Remove first K_3

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
```

- Current List (with age)**
- 1. *Mr. Meow (22 2000 0 NaN)*
 - 2. *Red Version Ultraman*

```
Mr. Meow
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1 P3X3K3
Red Version Ultraman
200 10 1 1880-09-12
0 400 300
```

DAY #4

Step 1

Add (Nothing)

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
```

Current List (with age)

- 1. Mr. Meow (22 2000 0 NaN)
- 2. Red Version Ultraman

```
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1
Red Version Ultraman
200 10 1 1880-09-12
0 400 300 P4X4K4
```

DAY #4

Step 2

Sort based on Panda Hospital policies

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
```

- Current List (with age)**
- 1. *Red Version Ultraman*
 - 2. *Mr. Meow (22 2000 0 NaN)*

```
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1
Red Version Ultraman
200 10 1 1880-09-12
0 400 300 P4X4K4
```

Current List (with age)

DAY #4

Step 3
Remove first X_4
Since the X_4 exceed the available list
we just remove the available list

Output

DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
DAY #4
Red Version Ultraman 200
Mr. Meow 22
INCOME TODAY: 1809

5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1
Red Version Ultraman
200 10 1 1880-09-12
0 400 300 $P_4 X_4 K_4$

Current List (with age)

DAY #4

Step 4

Since the list is empty, we don't need to remove anything for the next K_4

Output

```
DAY #1
Arthur 30
Vivian 20
Prof. Chen Yi Shin 19
Achita Kenjiiii 5
Angelina Panyananda 11
INCOME TODAY: 1674629
DAY #2
Mr. Meow 99
Mr. Meow 35
Mr. Meow 99
Mr. Meow 16
Mr. Meow 19
Aurick Daniel 45
INCOME TODAY: 10800
Day #3
INCOME TODAY: 0
DAY #4
Red Version Ultraman 200
Mr. Meow 22
INCOME TODAY: 1809
```

```
5 2000 0 NaN
Mr. Meow
16 2000 1 2023-12-01
Mr. Meow
35 2000 1 1992-11-23
Mr. Meow
22 2000 0 NaN
Mr. Meow
19 2000 1 2023-12-01
Mr. Meow
99 2000 1 1983-03-14
1 0 1
Red Version Ultraman
200 10 1 1880-09-12
0 400 300 P4 X4 K4
```

Special Limitation Testcases

For testcase 1-3: $(0 \leq N \leq 100), (\frac{\text{total lists per day}}{2} \leq X, K < 2^{31}), \text{ and } (0 \leq P \leq 100)$

For testcase 4-8: $(\frac{\text{total lists per day}}{2} \leq X + K < 2^{31}), (1 \leq N \leq 2000) \text{ and } (0 \leq P \leq 1000)$

For testcase 9-10: $(0 \leq X + K < 2^{31}), (1 \leq N \leq 2000) \text{ and } (0 \leq P \leq 1000)$

Happy Coding!