

SAMPLE TEST CASES

Input 1:

```
input.txt x
1 5
2 Hey Three, have you heard of AI Planet?
3 1 2 3
4 They are an awesome company that offers really cool internships to apply for!!
5 1 2 3
6 Twoooo!! My resume for AI Planet got shortlistedddd!!
7 2 1 2
8 Quick One c'mon, the deadline is tomorrow, you need to submit your assignment asap.
9 3 5 1
10 Wait whaaat?? That's great oneee. All the best!! I hope you crack it.
11 5 2 1
12
```

Simulating a conversation between a group of people. The index of each thread is referred to as their name spelled out.

Output(s) 1:

```
output.txt x
1 2 said,'Hey Three, have you heard of AI Planet?',to 3
2 2 said,'They are an awesome company that offers really cool internships to apply for!!',to 3
3 1 said,'Twoooo!! My resume for AI Planet got shortlistedddd!!',to 2
4 5 said,'Quick One c'mon, the deadline is tomorrow, you need to submit your assignment asap.',to 1
5 2 said,'Wait whaaat?? That's great oneee. All the best!! I hope you crack it.',to 1
6
```

This is just one of the possible outputs. Here we can see the messages with the highest priority have been printed out first. However, that may not be the case everytime, as we will see in the next run.

```
output.txt x
1 1 said,'Twoooo!! My resume for AI Planet got shortlistedddd!!',to 2
2 2 said,'Hey Three, have you heard of AI Planet?',to 3
3 2 said,'They are an awesome company that offers really cool internships to apply for!!',to 3
4 2 said,'Wait whaaat?? That's great oneee. All the best!! I hope you crack it.',to 1
5 5 said,'Quick One c'mon, the deadline is tomorrow, you need to submit your assignment asap.',to 1
6
```

On executing the program another time this is the output my code produced. Here, the first message printed out has a lower priority than both the second and third one. How is this possible? This is because all the threads are running concurrently. The first message has been sent by thread number 1, which spawned before thread

number 2. In this case, it just so happened that it was sent and received before the higher priority messages.

```
output.txt
1 2 said,'Hey Three, have you heard of AI Planet?',to 3
2 2 said,'They are an awesome company that offers really cool internships to apply for!!',to 3
3 1 said,'Twooo!! My resume for AI Planet got shortlistedddd!!',to 2
4 2 said,'Wait whaaat?? That's great oneeee. All the best!! I hope you crack it.',to 1
5 5 said,'Quick One c'mon, the deadline is tomorrow, you need to submit your assignment asap.',to 1
6
```

Here once again we can see a lower priority message has been printed earlier (second last one). This is also probably due to the fact that Thread number 2 spawns before Thread number 5.

Input 2:

```
input.txt
1 7
2 Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?
3 1 6 5
4 Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?
5 1 6 4
6 Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?
7 1 6 3
8 Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?
9 1 6 2
10 Deploy the Alpha team on the target.
11 2 4 3
12 I want 24 hours air surveillance of the area, immediately.
13 2 4 2
14 Roger that Six! This is base.. Backup is on the way.. over.
15 2 4 6
16
```

Simulating a hypothetical scenario on a battlefield

Output(s) 2:

```
output.txt
1 4 said,'Deploy the Alpha team on the target.',to 3
2 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 5
3 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 4
4 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 3
5 4 said,'Roger that Six! This is base.. Backup is on the way.. over.',to 6
6 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 2
7 4 said,'I want 24 hours air surveillance of the area, immediately. ',to 2
8
```

One point to note is that the order of messages that have been sent by the same thread might also differ in the output compared to in the input. Here, the messages by Thread 4 were printed in reverse order

even though they had the same priority and the recipient of the second message spawned earlier as well.

```
output.txt
1 4 said,'Deploy the Alpha team on the target.',to 3
2 4 said,'I want 24 hours air surveillance of the area, immediately. ',to 2
3 4 said,'Roger that Six! This is base.. Backup is on the way.. over.',to 6
4 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 5
5 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 3
6 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 4
7 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 2
8
```

Highest priority messages are printed at last.

```
output.txt
1 4 said,'Deploy the Alpha team on the target.',to 3
2 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 5
3 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 4
4 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 3
5 4 said,'Roger that Six! This is base.. Backup is on the way.. over.',to 6
6 6 said,'Mayday Mayday Mayday!!! Requesting immediate backup.. Does anyone copy?',to 2
7 4 said,'I want 24 hours air surveillance of the area, immediately. ',to 2
8
```

Another one of the possible outputs.

Input 3:

```
input.txt
1 10
2 Psst.. turn your answer sheet to the side
3 5 2 0
4 Psst.. hey one, I'll let you borrow my xbox if you tell me the answer to 2-b
5 5 2 1
6 Here you go, just draw the diagram and label it correctly.
7 7 2 3
8 you too Five, be quick, the teacher's not looking.
9 7 2 5
10 Four, man pleasee I really need to pass this exam. Just slide your paper a little to the left, I'm begging you.
11 2 5 4
12 Six, brother if you dont help me I'm gonna fail :(
13 2 5 6
14 SHHH.. dont disturb me man let me finish mine first
15 3 4 5
16 .....
17 3 6 5
18 hey didn't the teacher tell us she wasn't going to ask 2-b in the exam?
19 1 3 2
20 OMG!! Thank you so so so much Two!! You're a live saver!
21 10 5 2
```

Simulating an exam hall.

Output(s) 3:

```
output.txt
1 2 said,'Psst.. turn your answer sheet to the side',to 0
2 5 said,'Four, man pleasee I really need to pass this exam. Just slide your paper a little to the left, I'm
  begging you.',to 4
3 5 said,'Six, brother if you dont help me I'm gonna fail :( ',to 6
4 3 said,'hey didn't the teacher tell us she wasn't going to ask 2-b in the exam?',to 2
5 4 said,'SHHH.. dont disturb me man let me finish mine first',to 5
6 6 said,'.....',to 5
7 2 said,'Psst.. hey one, I'll let you borrow my xbox if you tell me the answer to 2-b',to 1
8 2 said,'Here you go, just draw the diagram and label it correctly.',to 3
9 2 said,'you too Five, be quick, the teacher's not looking.',to 5
10 5 said,'OMG!! Thank you so so so much Two!! You're a live saver!',to 2
11
```

One possible way to increase the likeliness of a particular order is by having other threads send multiple messages. For example here, Thread 3,4 and 6 just have one dialogue. In most runs, I observed that their messages were displayed before Thread 2 and Thread 5 finished all their dialogues.

```
output.txt
1 2 said,'Psst.. turn your answer sheet to the side',to 0
2 3 said,'hey didn't the teacher tell us she wasn't going to ask 2-b in the exam?',to 2
3 5 said,'Six, brother if you dont help me I'm gonna fail :( ',to 6
4 5 said,'Four, man pleasee I really need to pass this exam. Just slide your paper a little to the left, I'm
  begging you.',to 4
5 6 said,'.....',to 5
6 4 said,'SHHH.. dont disturb me man let me finish mine first',to 5
7 2 said,'Psst.. hey one, I'll let you borrow my xbox if you tell me the answer to 2-b',to 1
8 2 said,'you too Five, be quick, the teacher's not looking.',to 5
9 2 said,'Here you go, just draw the diagram and label it correctly.',to 3
10 5 said,'OMG!! Thank you so so so much Two!! You're a live saver!',to 2
11
```

Even though having the highest priority doesn't guarantee a message to be printed first, having the lowest priority does guarantee to a certain extent that it will be printed at last, as we can see in this case. In almost all runs I received the “..Thank you so..” message as the final log. It being sent by one of the later spawning threads might also add to the factors.

```
output.txt
1 2 said,'Psst.. turn your answer sheet to the side',to 0
2 2 said,'Psst.. hey one, I'll let you borrow my xbox if you tell me the answer to 2-b',to 1
3 3 said,'hey didn't the teacher tell us she wasn't going to ask 2-b in the exam?',to 2
4 6 said,'.....',to 5
5 5 said,'Four, man pleasee I really need to pass this exam. Just slide your paper a little to the left, I'm
  begging you.',to 4
6 5 said,'Six, brother if you dont help me I'm gonna fail :( ',to 6
7 4 said,'SHHH.. dont disturb me man let me finish mine first',to 5
8 2 said,'Here you go, just draw the diagram and label it correctly.',to 3
9 2 said,'you too Five, be quick, the teacher's not looking.',to 5
10 5 said,'OMG!! Thank you so so so much Two!! You're a live saver!',to 2
11
```

More the number of messages, more is the variation in output on every run. I received a different output on almost every run of this test case.

In conclusion, It's almost impossible to predict the output of the program due to the nature its parallel execution. However, there is a probability associated with the order of each message based in the order of creation of its sender and receiver, as well as its relative priority.