

Hotel Reservations

Background

Imagine you own a hotel with a certain number of identical rooms - let's call this number the **size** of your hotel. Your clients would like to make reservations for rooms: They e.g. call to check if they can make a reservation for one room from a certain start date **start** until a certain end date **end**. For each booking request you will have to check if there is a room available and either confirm the booking or reject it.

Goal

Your task is to write a small program, class and/or function to check the availability. In addition: Please implement the test cases described below to automatically test your algorithm.

You may use whatever programming language you prefer. Feel free to also include necessary libraries as you would normally do. **Please submit a *.zip archive containing a compileable / executable version including all your source code artifacts.**

Details

Assume you have a hotel with 3 rooms:

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
Room 1						
Room 2						
Room 3						

Let's represent bookings as tuple: (**startDay**, **endDay**), e.g. (0, 2). Guests always book full days: the booking (0, 0) blocks one room only on day 0. The booking (1, 3) will block a room for days 1/2/3.

After bookings (0, 0), (0, 2), (2, 4) and (2, 2) (which we all accept) our hotel might for example look like this.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
Room 1	X		X	X	X	
Room 2	X	X	X			
Room 3			X			

We would now have to decline another booking (2, 3).

Notes:

- Days are represented as the number of days from a certain date, e.g. day 0, day 1, day 2, ...; We will limit bookings to 1 year, that is 365 days.
- All rooms are identical and may be assumed to be numbered. The size of your hotel is **size** ≤ 1000.

- Guest do not change the room during their stay, but always stay within the room they moved in initially.
- If a booking request arrives and we can accept it, we accept it directly. We do not wait for later requests (e.g. to maximize the utilization of our rooms)

In case of additional questions: Feel free to make necessary assumptions. If you do so, please state and shortly explain your assumptions in your code.

Test Cases

Please implement the following test cases.

1a/1b: Requests outside our planning period are declined (Size=1)

	StartDate	EndDate	Result: Accept / Decline
Booking 1	-4	2	Decline

and

	StartDate	EndDate	Result: Accept / Decline
Booking 1	200	400	Decline

2: Requests are accepted (Size=3)

	StartDate	EndDate	Result: Accept / Decline
Booking 1	0	5	Accept
Booking 2	7	13	Accept
Booking 3	3	9	Accept
Booking 4	5	7	Accept
Booking 5	6	6	Accept
Booking 6	0	4	Accept

3: Requests are declined (Size=3)

	StartDate	EndDate	Result: Accept / Decline
Booking 1	1	3	Accept
Booking 2	2	5	Accept
Booking 3	1	9	Accept
Booking 4	0	15	Decline

4: Requests can be accepted after a decline (Size=3)

	StartDate	EndDate	Result: Accept / Decline
Booking 1	1	3	Accept
Booking 2	0	15	Accept
Booking 3	1	9	Accept
Booking 4	2	5	Decline
Booking 5	4	9	Accept

5: Complex Requests (Size=2)

	StartDate	EndDate	Result: Accept / Decline
Booking 1	1	3	Accept
Booking 2	0	4	Accept
Booking 3	2	3	Decline
Booking 4	5	5	Accept
Booking 5	4	10	Accept
Booking 6	10	10	Accept
Booking 7	6	7	Accept
Booking 8	8	10	Decline
Booking 9	8	9	Accept