1. (3rd question in Project #1) We have the following facts in a database:

rooms(name, capacity, left-hand-desk)
students(ID, desk-choice, courseID-list)
examdates(courseID, exam-date-list)

Write the predicate listdates(studentID) that takes a student ID and returns the list of exam dates for the courses the student takes.

Notes:
- The output list may contain duplicate elements.
- The given studentID may not exist in the database. In this case, the program must return an empty list as output.
- It is possible that a course name in courseID-list of the given student may not exist in examdates facts. In this case, the program must consider exam-date-list as empty for this course.
- You may not use the cut operator or any other imperative features.
- Do not assume any built-in predicates; all predicates must be defined.

2. (5th question in Project #2) We have the following definitions in a database:

(DEFINE Rooms '(room1, room2, ...))
(DEFINE Students '(student1, student2, ...))
(DEFINE ExamDates '(date1, date2, ...))

where the elements room1, student1 and date1 have, respectively, the following syntax:

(<roomname> <roomcapacity> <left-hand-desk-capacity>)
(<studentID> <desk-choice> (<courseID1> ... <courseIDN>))
(<courseID> (<exam-date1> ... <exam-dateN>))

Implement the function SUITABLE-ROOMS that takes a course ID and returns the list of suitable rooms, i.e., the ones that have enough number of left handed desks for the course.

3. Consider the following contour diagram and the calling sequence:

```
Main
   Sub1
      Sub2
         Sub3
      Sub4
         Sub5
```

Calling sequence:
- Main starts execution
- Main calls Sub1
- Sub1 calls Sub4
- Sub4 calls Sub2
- Sub2 terminates
- Sub4 calls Sub5
- Sub5 calls Sub2
- Sub2 calls Sub3

Show the contents of the run-time stack after each call/terminate according to the “display method”. Comment on the important points that differ this method from the static chain method. Also, explain how a variable referenced in a statement is accessed in this method.

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4. Consider the following contour diagram and the calling sequence:

**Main**

```
\[ \begin{array}{c}
v, u \\
Sub1 \\
v, w \\
Sub2 \\
w, x \\
Sub3 \\
x, z
\end{array} \]
```

**Calling sequence:**

- Main starts execution
- Main calls Sub1
- Sub1 calls Sub1
- Sub1 calls Sub2
- Sub2 calls Sub3

Show the contents of the run-time stack after the last call (i.e. after Sub2 calls Sub3) according to the “deep access” ("dynamic chain") method. Comment on the important points that differ this method from the static chain method. Also, explain how a variable referenced in a statement is accessed in this method.

**Notes:**
- Questions 1:20 points, 2,4:25 points, 3:30 points
- Time: 1:30 hours
- Close notes and books