Analysis and Design of Algorithms

Semester III, Year **2021-22**

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AIM:

1.There are a total of numCourses courses you have to take, labeled from 0 to numCourses - 1. You are given an array prerequisites where prerequisites[i] = [ai, bi] indicates that you must take course bi first if you want to take course ai.

A. For example, the pair [0, 1], indicates that to take course 0 you have to first take course 1.

Return true if you can finish all courses. Otherwise, return false.

Question 1:

Pseudo Code:

```
START
CLASS course:
   FUNCTION end(self, numCourses, preRequisites) -> bool:
      IF not preRequisites:
         RETURN True
      ENDIF
      map <- {}
      for i, j in preRequisites:
         IF i not in map:
            map[i] <- set()
         ENDIF
         IF j not in map:
            map[j] <- set()
         ENDIF
         map[i].add(j)
      ENDFOR
      visited <- {}
      for i in range(numCourses):
         IF i in map AND i not in visited:
            IF  dfs(map, visited, i) = False:
               RETURN False
         ENDIF
            ENDIF
      ENDFOR
      RETURN True
   ENDFUNCTION

   FUNCTION dfs(self, map, visited, curr):
      IF curr in visited:
         IF visited[curr] = True: RETURN False
         ELSE: RETURN True
      ENDIF
         ENDIF
      visited[curr] <- True
      curr_res <- True
      for nbr in map[curr]:
         curr_res <- curr_res AND  dfs(map, visited, nbr)
      ENDFOR
      visited[curr] <- False
      RETURN curr_res
   ENDFUNCTION

ENDCLASS

numCourses <- int(input('Enter No.of Courses : '))
preRequisites <- []
n <- int(input('Enter size of Prerequisites Array : '))
OUTPUT 'Enter prerequisites : '
```

```
for i in range(n):
    p <- list(map(int, input().split()))
    preRequisites.append(p)
ENDFOR
obj <- course()
OUTPUT obj.end(numCourses, preRequisites)END
```

Output: