

## QUIZ 9

Source Code:

```
class Graph():
    def __init__(self, vertices):
        self.graph = [[0 for column in range(vertices)]
                       for row in range(vertices)]
        self.V = vertices

    def isSafe(self, v, pos, path):

        if self.graph[ path[pos-1] ][v] == 0:
            return False

        for vertex in path:
            if vertex == v:
                return False

        return True

    def hCycleUtil(self, path, pos):

        if pos == self.V:

            if self.graph[ path[pos-1] ][ path[0] ] == 1:
                return True
            else:
                return False

        for v in range(1,self.V):

            if self.isSafe(v, pos, path) == True:

                path[pos] = v

                if self.hCycleUtil(path, pos+1) == True:
                    return True

                path[pos] = -1

        return False
```

```

def hCycle(self):
    path = [-1] * self.V

    path[0] = 0

    if self.hCycleUtil(path,1) == False:
        print ("There is no Hamiltonian Cycle in the graph\n")
        return False

    self.printSolution(path)
    return True

def printSolution(self, path):
    print ("Solution Exists: Following",
          "is one Hamiltonian Cycle")
    for vertex in path:
        print (vertex, end = " ")
    print (path[0], "\n")

#Test case 1:

g1 = Graph(4)
g1.graph = [ [0,1,1,1],[1,0,1,1],[1,1,0,1],[1,1,1,0]]

g1.hCycle();

#Test case 2:

g2 = Graph(12)
g2.graph = [ [0,1,0,0,1,0,0,0,0,0,0,0],
              [1,0,0,0,0,0,1,1,0,0,0,0],
              [0,1,0,1,0,0,0,1,0,0,0,0],
              [0,0,1,0,0,0,0,0,1,0,0,0],
              [1,0,0,0,0,1,0,0,0,1,0,0],
              [0,0,0,0,1,0,1,0,0,0,1,0],
              [0,1,0,0,0,1,0,1,0,0,0,0],
              [0,1,1,0,0,0,1,0,1,0,0,0],
              [0,0,0,0,0,0,0,1,0,0,0,1],
              [0,0,0,0,1,0,0,0,0,0,1,0],
              [0,0,0,0,0,1,0,0,0,1,0,1],
              [0,0,0,0,0,0,0,0,1,0,1,0] ]

g2.hCycle();

```

Output:

**Both test cases:**

```
harshavaidhyam@Harshas-MacBook-Pro quiz 9 % cd /Users/harshavaidhyam/Desktop/Pitt\
term-1/Algo\ Design/quiz\ 9 ; /usr/bin/env /usr/local/bin/python3 /Users/harshavaidh
yam/.vscode/extensions/ms-python.python-
2022.16.1/pythonFiles/lib/python/debugpy/adapters/..../debugpy/launcher 54743 --
/Users/harshavaidhyam/Desktop/Pitt\ term-1/Algo
\ Design/quiz\ 9/quiz9.py
```

**One Hamiltonian Cycle**

**0 1 2 3 0**

**There is no Hamiltonian Cycle in the graph**