

Practical- 4 DAA

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Code-

```
class NQueens:  
    def __init__(self) -> None:  
        self.size = int(input("Enter size of chessboard: "))  
        self.board = [[False]*self.size for _ in range(self.size)]  
        self.count = 0  
    def printBoard(self):  
        for row in self.board:  
            for ele in row:  
                if ele == True:  
                    print("Q",end=" ")  
                else:  
                    print("X",end=" ")  
            print()  
        print()  
  
    def isSafe(self,row:int,col:int) -> bool:  
  
        # Check Column(above and below of the (row,col))  
        for i in self.board:  
            if i[col] == True:  
                return False  
  
        # Check backward slash(\) diagonal only in above direction  
        i = row  
        j = col  
        while i >= 0 and j >= 0:  
            if self.board[i][j] == True:  
                return False  
            i -= 1  
            j -= 1  
        # Check backward slash(\) diagonal only in below direction  
        i = row  
        j = col  
        while i < self.size and j < self.size:  
            if self.board[i][j] == True:  
                return False  
            i += 1  
            j += 1  
  
        # Check forward slash diagonal(/) only in above direction  
        i = row  
        j = col
```

```

while i >= 0 and j < self.size:
    if self.board[i][j] == True:
        return False
    i -= 1
    j += 1

# Check forward slash diagonal(/) only in below direction
i = row
j = col
while i < self.size and j >= 0:
    if self.board[i][j] == True:
        return False
    i += 1
    j -= 1

return True

def set_position_first_queen(self):
    print("Enter coordinates of first queen: ")
    row = int(input(f"Enter row (1-{self.size}): "))
    col = int(input(f"Enter column (1-{self.size}): "))
    self.board[row-1][col-1] = True
    self.printBoard()

def solve(self, row:int):
    if row == self.size:
        self.count += 1
        self.printBoard()
        return

    if any(self.board[row]): is True:
        self.solve(row+1)
        return

    for col in range(self.size):
        if self.isSafe(row, col) == True:
            self.board[row][col] = True
            self.solve(row+1)
            self.board[row][col] = False

def displayMessage(self):
    if self.count > 0:
        print("Solution exists for the given position of the queen.")
    else:
        print("Solution doesn't exist for the given position of the queen.")

solver = NQueens()
solver.set_position_first_queen()
solver.solve(0)

```

```
solver.displayMessage()
```

Output-

```
pratham_mahabare@fedora:~/Downloads/LP-3/DAA$ python3 4_n-queens.py
Enter size of chessboard: 8
Enter coordinates of first queen:
Enter row (1-8): 1
Enter column (1-8): 1
Q X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X

Q X X X X X X X
X X X X Q X X X
X X X X X X X Q
X X X X X Q X X
X X Q X X X X X
X X X X X X Q X
X Q X X X X X X
X X X Q X X X X

Q X X X X X X X
X X X X X Q X X
X X X Q X X X X
X X X X X Q X X
X X X X X X X Q
X Q X X X X X X
X X X Q X X X X
X X X X Q X X X

Q X X X X X X X
X X X X X X Q X
X X X Q X X X X
X X X X X Q X X
X X X X X X X Q
X Q X X X X X X
X X X Q X X X X
X X Q X X X X X

Solution exists for the given position of the queen.
pratham_mahabare@fedora:~/Downloads/LP-3/DAA$
```