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FP Practical 5

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: (2CSE403) FUNCTIONAL PROGRAMMING

Practical 5

1. (Simulation: coupon collector's problem) Coupon Collector is a classic statistics problem with many practical applications. The problem is to pick objects from a set of objects repeatedly and find out how many picks are needed for all the objects to be picked at least once. A variation of the problem is to pick cards from a shuffled deck of 52 cards repeatedly and find out how many picks are needed before you see one of each suit. Assume a picked card is placed back in the deck before picking another. Write a program to simulate the number of picks needed to get four cards, one from each suit and display the four cards picked (it is possible a card may be picked twice).

Code :

```
import random


def ysl_card():
    suit = ("Clubs", "Diamonds", "Heart", "Spades")
    rank = ("Ace", 2, 3, 4, 5, 6, 7, 8, 9, 10, "Jack", "Queen", "King")
    y = random.randint(0, 51)
    return rank[y % 13], suit[y // 13]


suits = set()
i = 1
```

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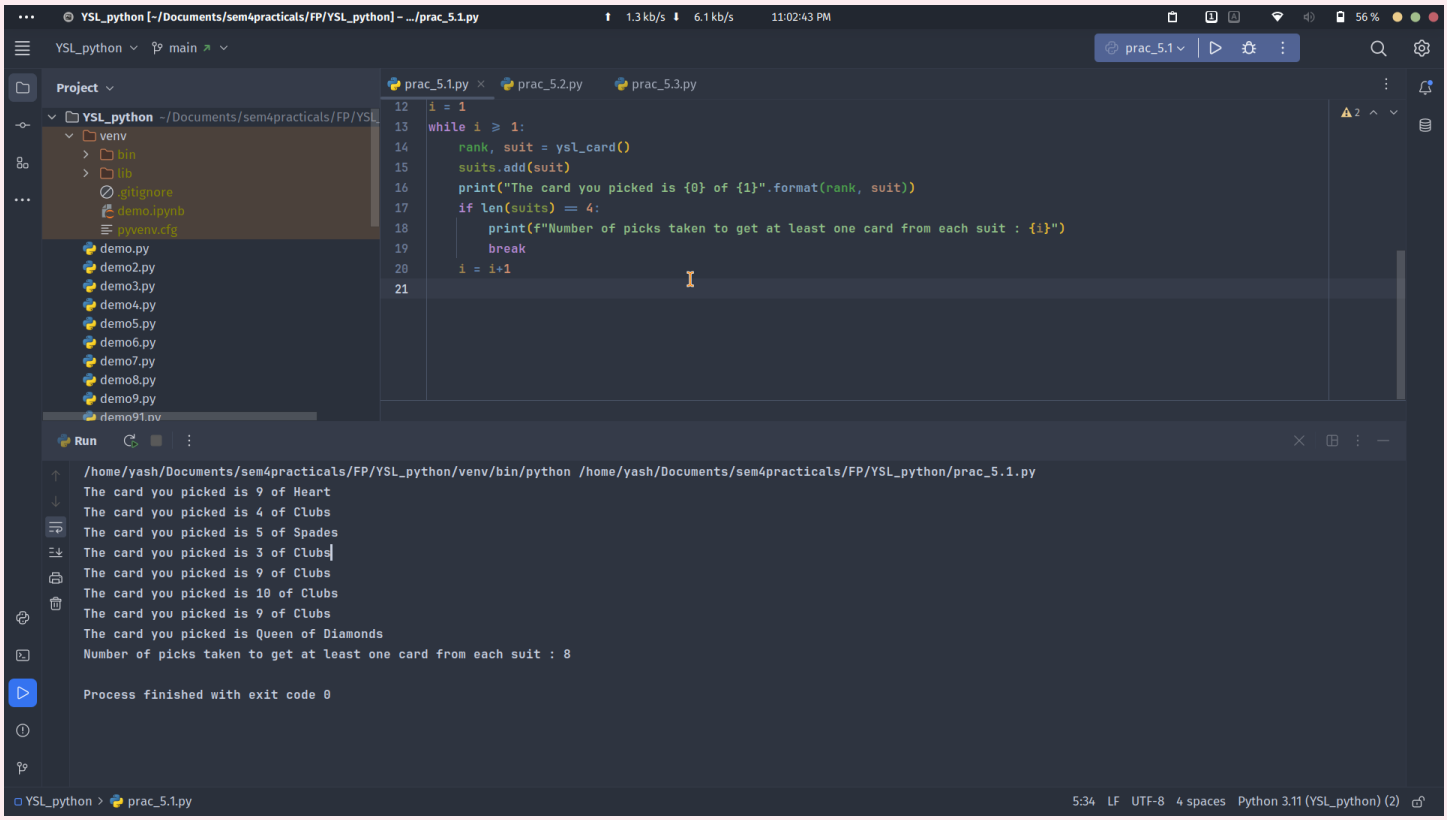
```
while i ⩾ 1:
    rank, suit = ysl_card()
    suits.add(suit)
    print("The card you picked is {0} of {1}".format(rank, suit))
    if len(suits) == 4:
        print(f"Number of picks taken to get at least one card from each
suit : {i}")
        break
    i = i+1
```

Output :



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2. A scientist is implementing an algorithm that passes through the list. On each pass, successive neighboring pairs are compared. If a pair is in decreasing order, its values are swapped; otherwise, the values remain unchanged. Gradually values bubble their way to the top and the larger values sink to the bottom. Help the scientist to test program that reads in ten numbers, invokes the function, and displays the resultant numbers.

Code :

```
def bblesrt(ysl: list):
    for i in range(len(ysl) - 1):
        for j in range(len(ysl) - i - 1):
            if ysl[j] > ysl[j + 1]:
                ysl[j], ysl[j + 1] = ysl[j + 1], ysl[j]



ysl_lst = []
print("\nEnter 10 elements to add in a list : ")
for i in range(0, 10):
    ysl_lst.append(int(input("")))
bblesrt(ysl_lst)
print(f"The sorted list is : {ysl_lst}")
```

Output :

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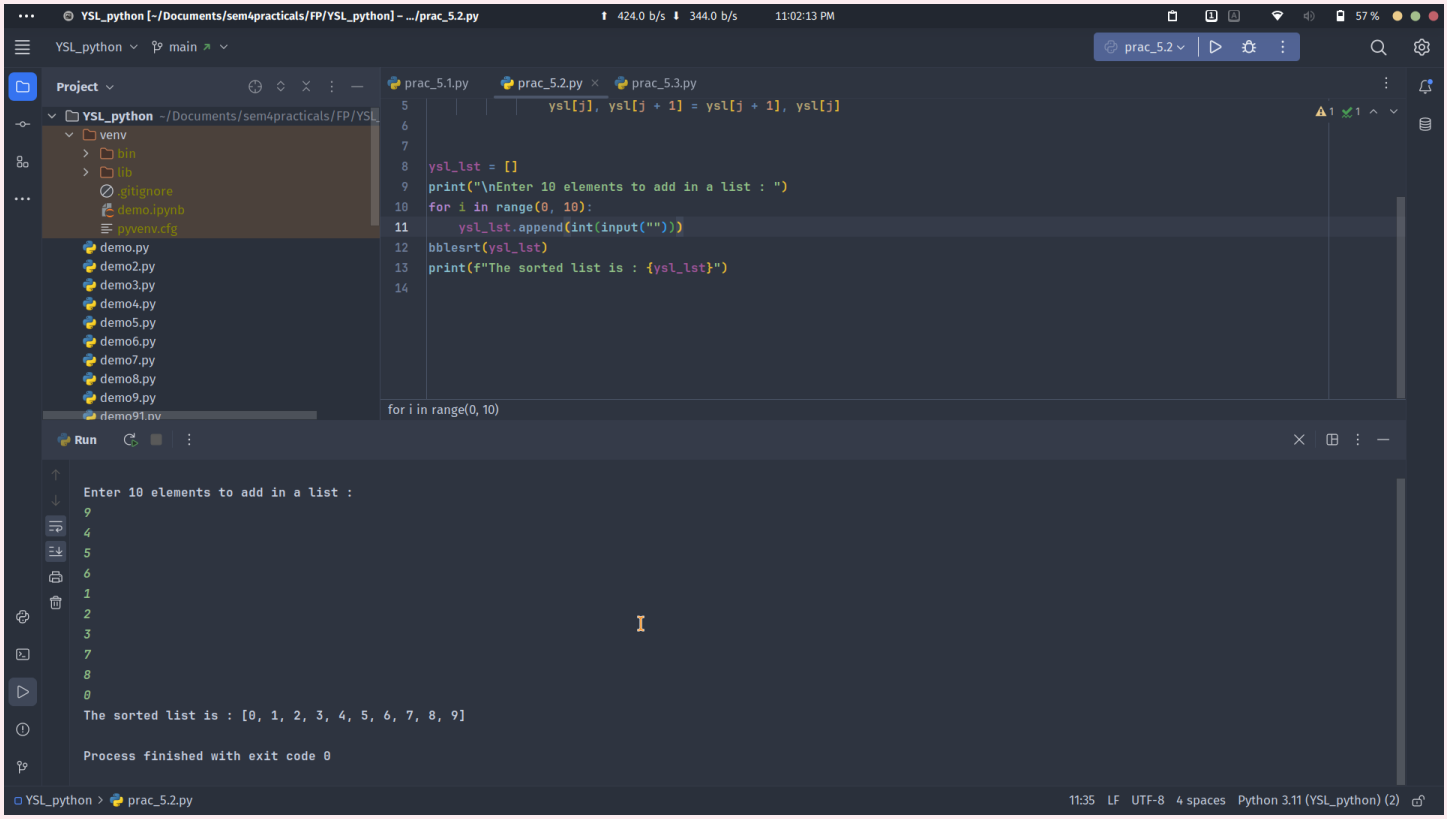

3. Given a matrix with N rows and M columns, the task is to check if the matrix is a Binary Matrix. A binary matrix is a matrix in which all the elements are either 0 or 1.

   Input Format: The first line of the input contains two integer number N and M which represents the number of rows and the number of columns respectively, separated by a space. From the second line, take N lines input with each line containing M integer elements with each element separated by a space (not compulsory).

   Output Format: Print 'YES' or 'NO' accordingly

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Code :

```
def idntty(rows, cols, a):
   if rows ≠ cols:
       return False
   else:
       for i in range(0, rows):
           for j in range(0, cols):
               if i == j and a[i][j] ≠ 1:
                   return False
               elif i ≠ j and a[i][j] ≠ 0:
                   return False
               else:
                   return True


def bnry(rows, cols, a):
   for i in range(rows):
       for j in range(cols):
           if a[i][j] not in [0, 1]:
               return False
           return True


rows = int(input("Enter number of rows : "))
```

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```
cols = int(input("Enter number of columns : "))
mat = [[i * j for i in range(rows)] for j in range(cols)]
for i in range(0, rows):
    for j in range(0, cols):
        mat[i][j] = int(input(f"Enter element a[{i}][{j}] : "))

print("\n\tThe Matrix is : \n")
for i in range(rows):
    for j in range(cols):
        print(mat[i][j], end=" ")
    print("")

if idntty(rows, cols, mat):
    print("\n\tYes, it is Identity Matrix")
else:
    print("\n\tNo, it is not Identity Matrix")

if bnry(rows, cols, mat):
    print("\n\tYes, it is Binary Matrix")
else:
    print("\n\tNo, it is not Binary Matrix")
```

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Output :