Assignment 01 (AND and XOR operation)

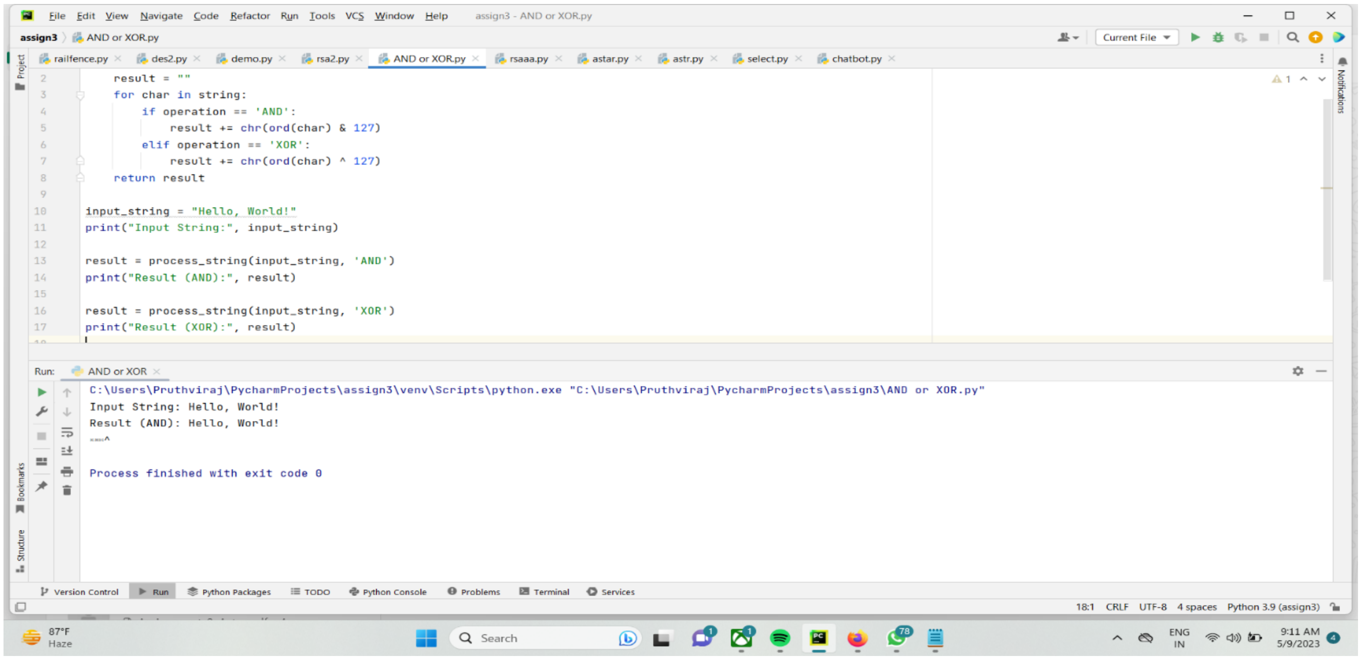
Roll No.335

Batch: B

Code:

```python
def process_string(string, operation):
    result = ""
    for char in string:
        if operation == 'AND':
            result += chr(ord(char) & 127)
        elif operation == 'XOR':
            result += chr(ord(char) ^ 127)
    return result

input_string = "Hello, World!"
print("Input String:", input_string)

result = process_string(input_string, 'AND')
print("Result (AND):", result)

result = process_string(input_string, 'XOR')
print("Result (XOR):", result)
```

output:



```python
    result = ""
    for char in string:
        if operation == 'AND':
            result += chr(ord(char) & 127)
        elif operation == 'XOR':
            result += chr(ord(char) ^ 127)
    return result

input_string = "Hello, World!"
print("Input String:", input_string)

result = process_string(input_string, 'AND')
print("Result (AND):", result)

result = process_string(input_string, 'XOR')
print("Result (XOR):", result)
```

```
C:\Users\Pruthviraj\PycharmProjects\assign3\venv\Scripts\python.exe "C:\Users\Pruthviraj\PycharmProjects\assign3\AND or XOR.py"
Input String: Hello, World!
Result (AND): Hello, World!
[illegible]^

Process finished with exit code 0
```

Assignment No. 02(Rail Fence Cipher)

Roll No.335

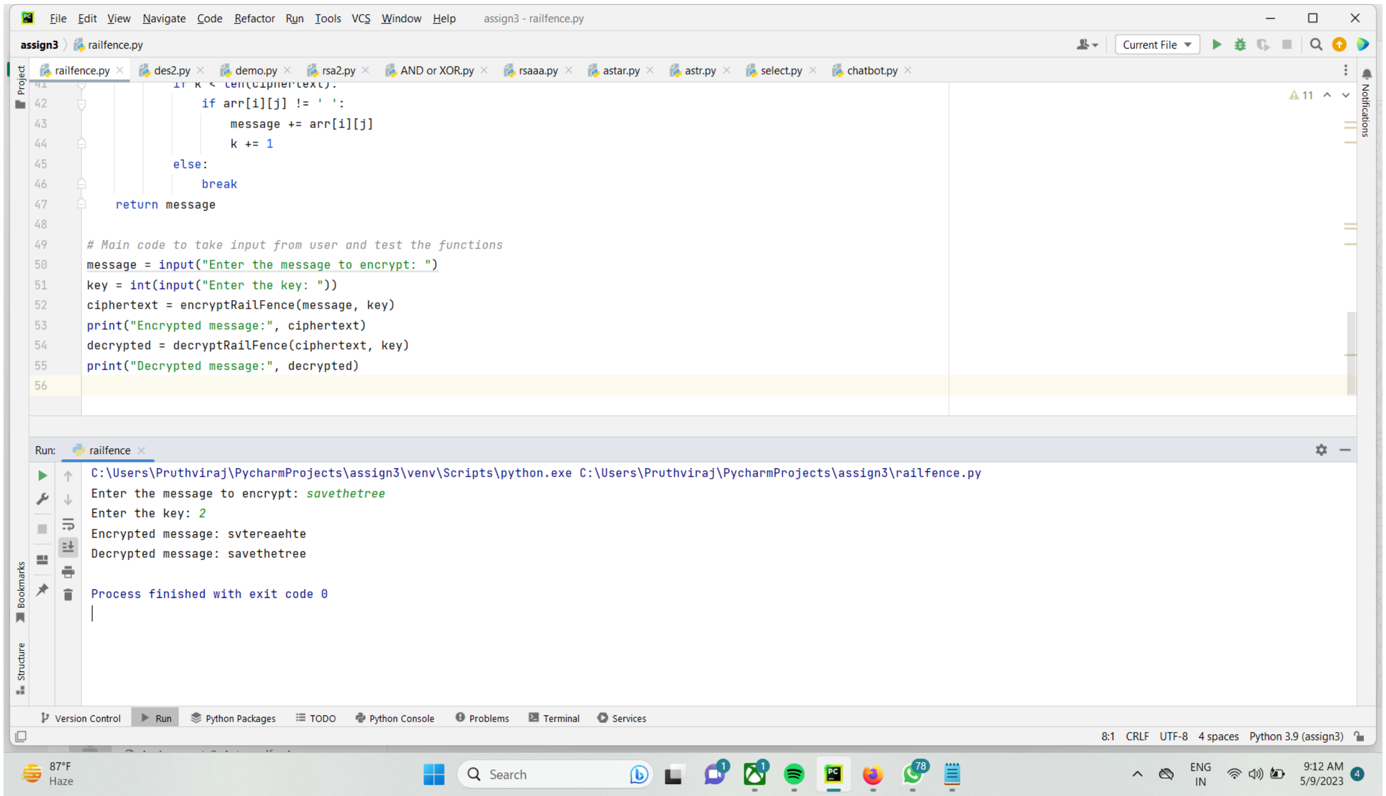
Batch: B

Code:

```
import math

# Encryption function for Rail Fence Cipher
def encryptRailFence(message, key):
    message = message.replace(" ", "") # remove spaces from message
    num_rows = key
    num_cols = math.ceil(len(message) / num_rows)
    arr = [[' ' for j in range(num_cols)] for i in range(num_rows)]
    k = 0
    for j in range(num_cols):
        for i in range(num_rows):
            if k < len(message):
                arr[i][j] = message[k]
                k += 1
            else:
                break
    ciphertext = ""
    for i in range(num_rows):
        for j in range(num_cols):
            ciphertext += arr[i][j]
    return ciphertext

# Decryption function for Rail Fence Cipher
def decryptRailFence(ciphertext, key):
    ciphertext = ciphertext.replace(" ", "") # remove spaces from ciphertext
    num_rows = key
    num_cols = math.ceil(len(ciphertext) / num_rows)
    arr = [[' ' for j in range(num_cols)] for i in range(num_rows)]
    k = 0
    for i in range(num_rows):
        for j in range(num_cols):
            if k < len(ciphertext):
                arr[i][j] = ciphertext[k]
                k += 1
            else:
                break
    message = ""
    k = 0
    for j in range(num_cols):
        for i in range(num_rows):
            if k < len(ciphertext):
                if arr[i][j] != ' ':
                    message += arr[i][j]
                    k += 1
            else:
                break
    return message
```

```
# Main code to take input from user and test the functions
message = input("Enter the message to encrypt: ")
key = int(input("Enter the key: "))
ciphertext = encryptRailFence(message, key)
print("Encrypted message:", ciphertext)
decrypted = decryptRailFence(ciphertext, key)
print("Decrypted message:", decrypted)
```

Output:



File Edit View Navigate Code Refactor Run Tools VCS Window Help
assign3 - railfence.py
assign3 railfence.py
Current File
railfence.py des2.py demo.py rsa2.py AND or XOR.py rsaaa.py astar.py astr.py select.py chatbot.py
Project
Notifications
Run: railfence
Bookmarks
Structure
Version Control Run Python Packages TODO Python Console Problems Terminal Services
8:1 CRLF UTF-8 4 spaces Python 3.9 (assign3)
87°F Haze
Search
ENG IN
9:12 AM 5/9/2023

```
            if k < len(ciphertext):
                if arr[i][j] != ' ':
                    message += arr[i][j]
                    k += 1
            else:
                break
    return message

# Main code to take input from user and test the functions
message = input("Enter the message to encrypt: ")
key = int(input("Enter the key: "))
ciphertext = encryptRailFence(message, key)
print("Encrypted message:", ciphertext)
decrypted = decryptRailFence(ciphertext, key)
print("Decrypted message:", decrypted)
```

```
C:\Users\Pruthviraj\PycharmProjects\assign3\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\assign3\railfence.py
Enter the message to encrypt: savethetree
Enter the key: 2
Encrypted message: svtereaehte
Decrypted message: savethetree

Process finished with exit code 0
```

Assignment No. 04(RSA algorithm)

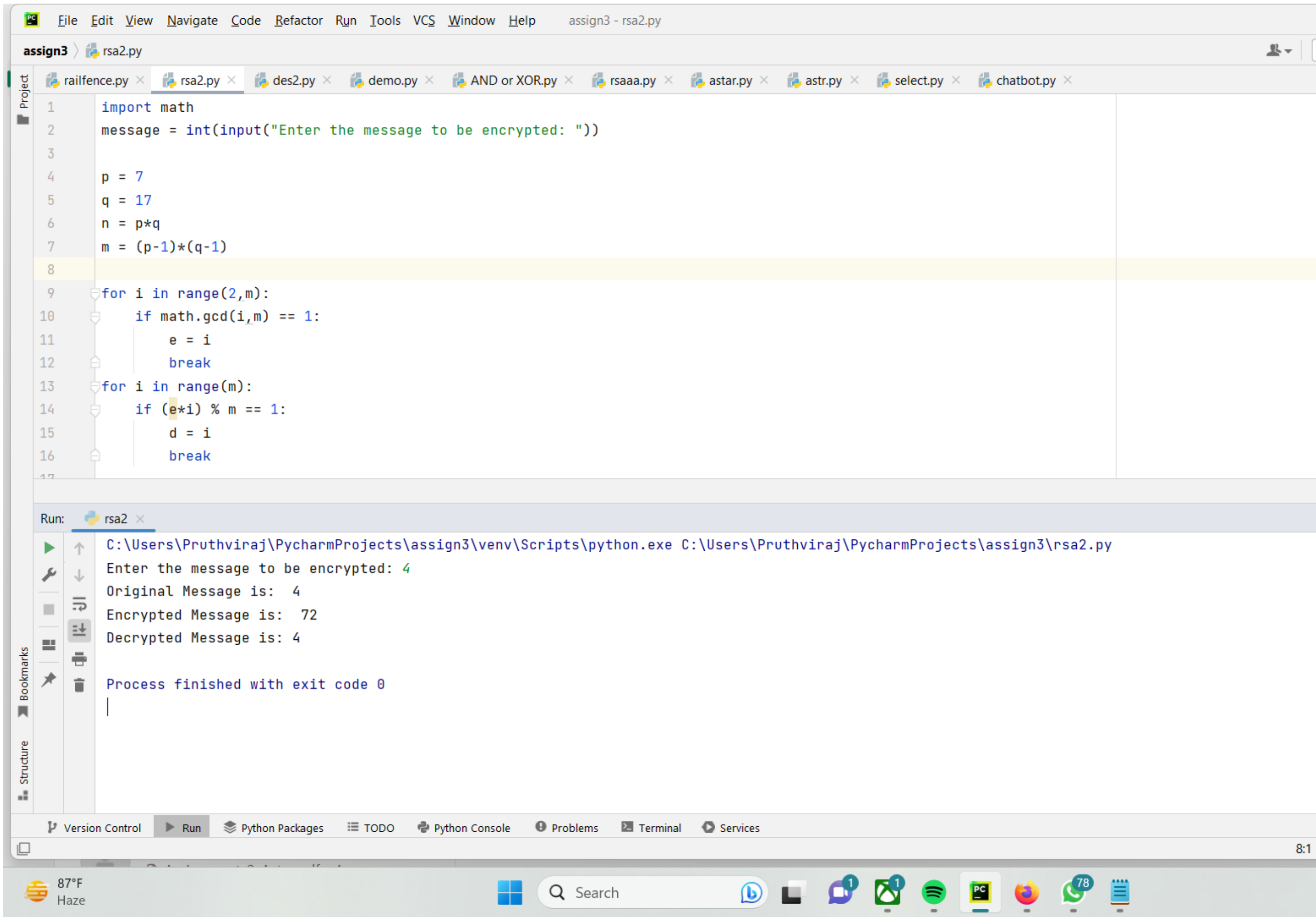
Roll No.335

Batch: B

Code:

```
import math
message = int(input("Enter the message to be encrypted: "))

p = 7
q = 17
n = p*q
m = (p-1)*(q-1)

for i in range(2,m):
    if math.gcd(i,m) == 1:
        e = i
        break
for i in range(m):
    if (e*i) % m == 1:
        d = i
        break

def encrypt(me):
    c = pow(message, e, n)
    return c
def decrypt(ct):
    p = pow(ct, d, n)
    return p

print("Original Message is: ", message)
CT = encrypt(message)
print("Encrypted Message is: ", CT)
PT = decrypt(CT)
print("Decrypted Message is:", PT)
```

Output:


File Edit View Navigate Code Refactor Run Tools VCS Window Help
assign3 - rsa2.py
assign3 rsa2.py
railfence.py rsa2.py des2.py demo.py AND or XOR.py rsaaa.py astar.py astr.py select.py chatbot.py
Run: rsa2
Version Control Run Python Packages TODO Python Console Problems Terminal Services
87°F Haze
Search

```
import math
message = int(input("Enter the message to be encrypted: "))

p = 7
q = 17
n = p*q
m = (p-1)*(q-1)

for i in range(2,m):
    if math.gcd(i,m) == 1:
        e = i
        break
for i in range(m):
    if (e*i) % m == 1:
        d = i
        break
```

```
C:\Users\Pruthviraj\PycharmProjects\assign3\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\assign3\rsa2.py
Enter the message to be encrypted: 4
Original Message is:  4
Encrypted Message is:  72
Decrypted Message is: 4

Process finished with exit code 0
```

Assignment No.5(Diffi-Hellman Algorithm)

Roll No. 335

Batch: B

Code:

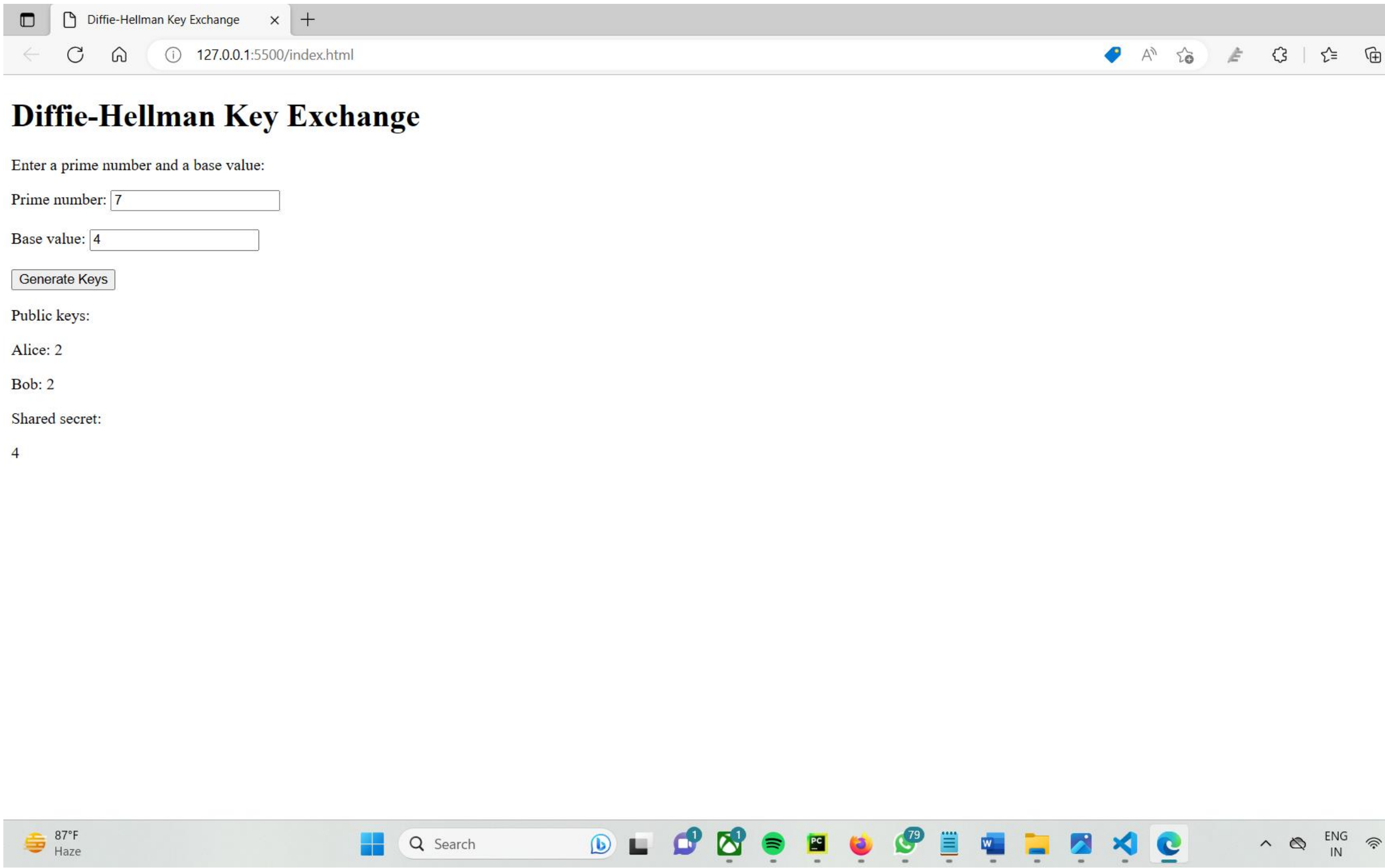
HTML File:

```
<!DOCTYPE html>
<html>
<head>
    <title>Diffie-Hellman Key Exchange</title>
</head>
<body>
    <h1>Diffie-Hellman Key Exchange</h1>
    <p>Enter a prime number and a base value:</p>
    <form>
        <label for="prime">Prime number:</label>
        <input type="number" id="prime" name="prime"><br><br>
        <label for="base">Base value:</label>
        <input type="number" id="base" name="base"><br><br>
        <button type="button" onclick="generateKeys()">Generate Keys</button>
    </form>
    <p>Public keys:</p>
    <p>Alice: <span id="alicePubKey"></span></p>
    <p>Bob: <span id="bobPubKey"></span></p>
    <p>Shared secret:</p>
    <p><span id="sharedSecret"></span></p>

    <script src="script.js"></script>
</body>
</html>
```

Jscript File:

```
function isPrime(n) {
    if (n < 2) return false;
    for (let i = 2; i <= Math.sqrt(n); i++) {
        if (n % i === 0) return false;
    }
    return true;
}

function generateKeys() {
    const prime = parseInt(document.getElementById("prime").value);
    const base = parseInt(document.getElementById("base").value);

    if (!isPrime(prime)) {
        alert("Please enter a prime number.");
        return;
    }

    const alicePrivateKey = Math.floor(Math.random() * (prime - 2)) + 2;
    const bobPrivateKey = Math.floor(Math.random() * (prime - 2)) + 2;

    const alicePublicKey = modExp(base, alicePrivateKey, prime);
    const bobPublicKey = modExp(base, bobPrivateKey, prime);

    const sharedSecret = modExp(alicePublicKey, bobPrivateKey, prime);

    document.getElementById("alicePubKey").textContent = alicePublicKey;
    document.getElementById("bobPubKey").textContent = bobPublicKey;
    document.getElementById("sharedSecret").textContent = sharedSecret;
}

function modExp(base, exponent, modulus) {
    if (modulus === 1) return 0;

    let result = 1;
    base = base % modulus;
    while (exponent > 0) {
        if (exponent % 2 === 1) {
            result = (result * base) % modulus;
        }
        exponent = Math.floor(exponent / 2);
        base = (base * base) % modulus;
    }
    return result;
}
```

Output:



Diffie-Hellman Key Exchange

Enter a prime number and a base value:

Prime number: 7

Base value: 4

Generate Keys

Public keys:

Alice: 2

Bob: 2

Shared secret:

4

Assignment No. 01(BFS & DFS)

Roll No. 335

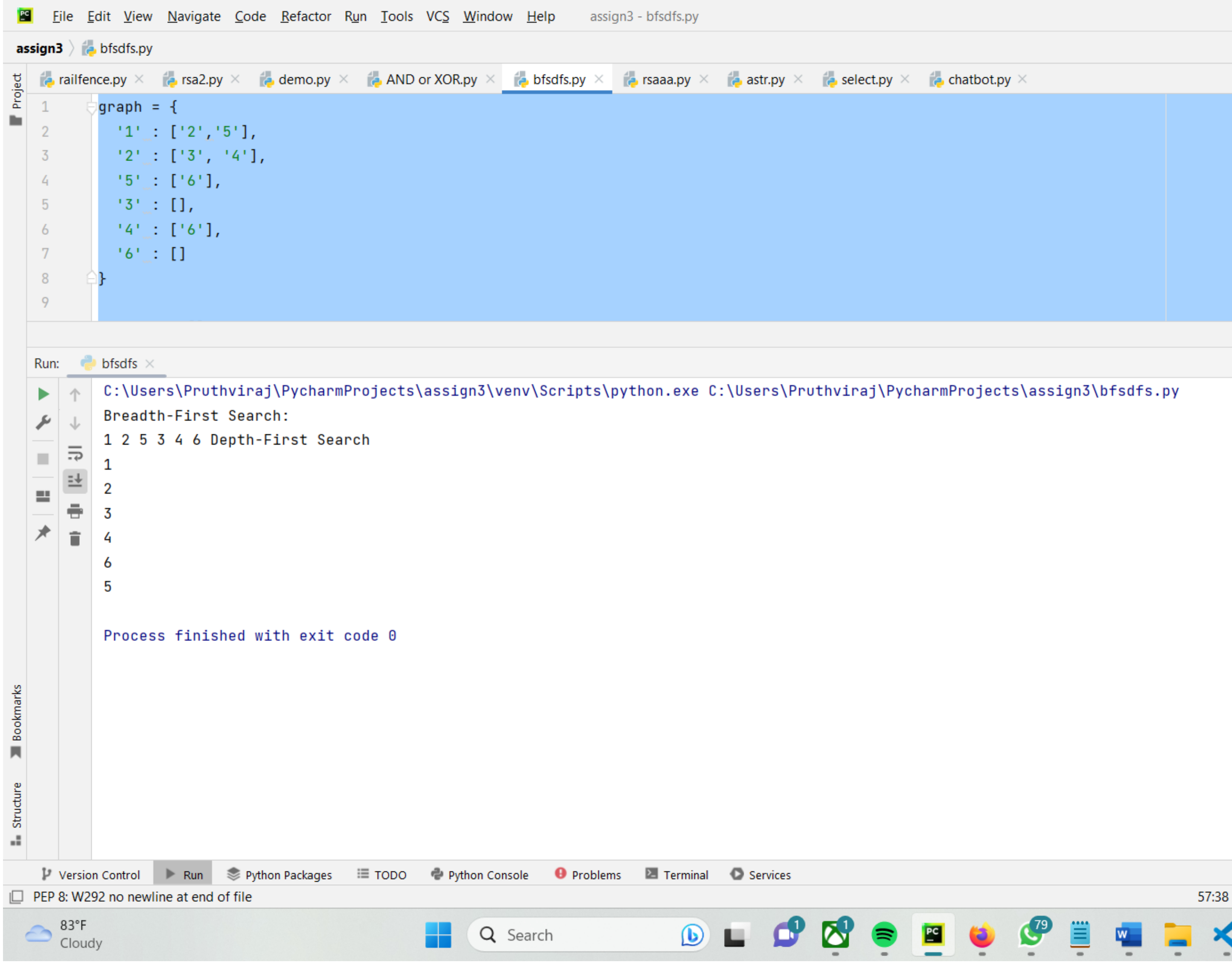
Batch: B

Code:

```
graph = {
  '1' : ['2','5'],
  '2' : ['3', '4'],
  '5' : ['6'],
  '3' : [],
  '4' : ['6'],
  '6' : []
}

visited = []
queue = []

def breadthFirstSearch(visited, graph, node):
  visited.append(node)
  queue.append(node)

  while queue:
    m = queue.pop(0)
    print (m, end = " ")

    for neighbour in graph[m]:
      if neighbour not in visited:
        visited.append(neighbour)
        queue.append(neighbour)

print("Breadth-First Search: ")
breadthFirstSearch(visited, graph, '1')

# Program Output:-

# Breadth-First Search:
# 1 2 5 3 4 6



# Depth First Search:

graph = {
  '1' : ['2','5'],
  '2' : ['3', '4'],
  '5' : ['6'],
  '3' : [],
  '4' : ['6'],
  '6' : []
}

visited = set()
```

```
def depthFirstSearch(visited, graph, node):
    if node not in visited:
        print (node)
        visited.add(node)
        for neighbour in graph[node]:
            depthFirstSearch(visited, graph, neighbour)

print("Depth-First Search")
depthFirstSearch(visited, graph, '1')
```

Output:



```
graph = {
  '1' : ['2','5'],
  '2' : ['3', '4'],
  '5' : ['6'],
  '3' : [],
  '4' : ['6'],
  '6' : []
}
```

```
C:\Users\Pruthviraj\PycharmProjects\assign3\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\assign3\bfsdfs.py
Breadth-First Search:
1 2 5 3 4 6 Depth-First Search
1
2
3
4
6
5

Process finished with exit code 0
```

PEP 8: W292 no newline at end of file

Assignment No.02 (Selection Sort)

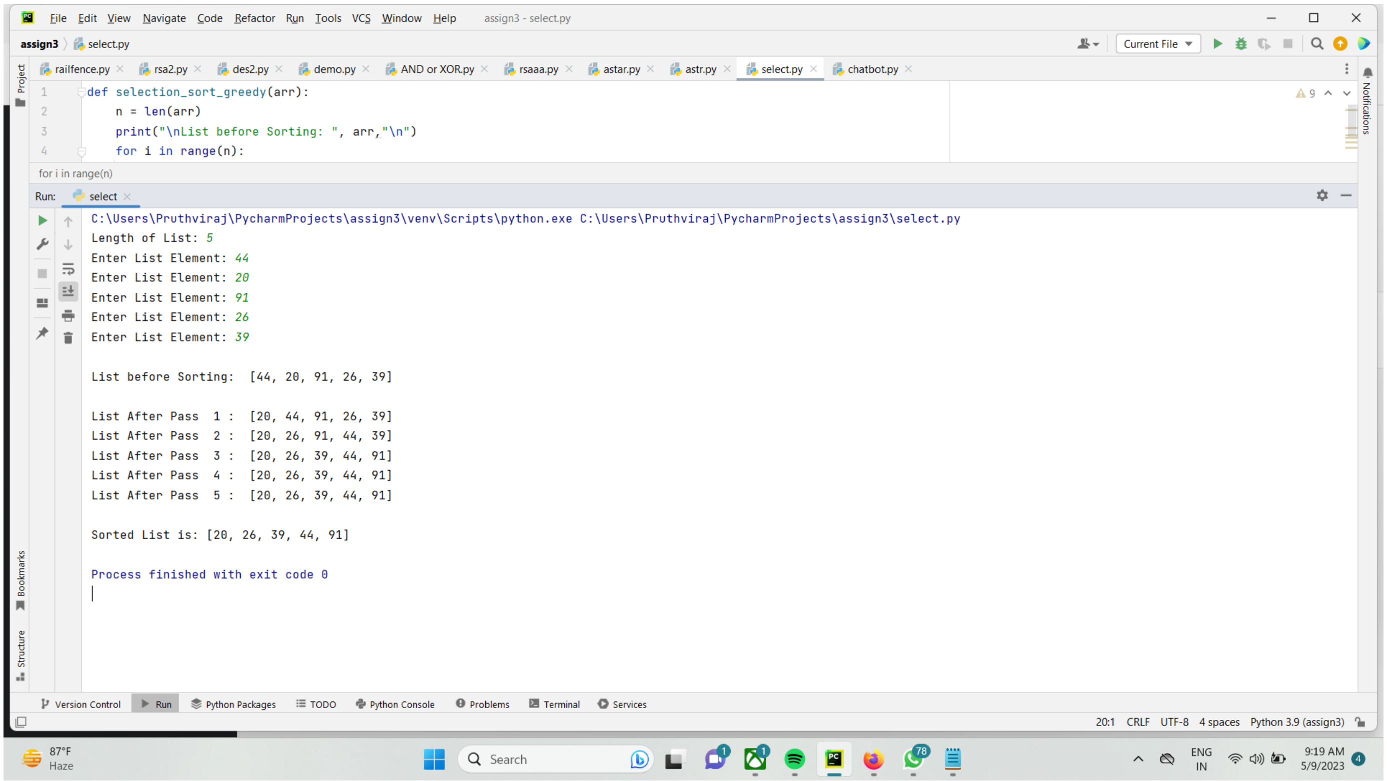
Roll No. 335

Batch : B

Code:

```
def selection_sort_greedy(arr):
    n = len(arr)
    print("\nList before Sorting: ", arr,"\n")
    for i in range(n):
        min_idx = i
        for j in range(i+1, n):
            if arr[j] < arr[min_idx]:
                min_idx = j
        arr[i], arr[min_idx] = arr[min_idx], arr[i]
        print("List After Pass ",i+1,": ",arr)
    return arr

n=int(input("Length of List: "))
arr=[]
for i in range(n):
    element=int(input("Enter List Element: "))
    arr.append(element)
print("\nSorted List is:", selection_sort_greedy(arr))
```

Output:



File Edit View Navigate Code Refactor Run Tools VCS Window Help
assign3 - select.py
assign3 › select.py
Current File
railfence.py rsa2.py des2.py demo.py AND or XOR.py rsaaa.py astar.py astr.py select.py chatbot.py
for i in range(n)
Run: select
Version Control Run Python Packages TODO Python Console Problems Terminal Services
20:1 CRLF UTF-8 4 spaces Python 3.9 (assign3)
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Search
ENG IN
9:19 AM 5/9/2023

```
def selection_sort_greedy(arr):
    n = len(arr)
    print("\nList before Sorting: ", arr,"\n")
    for i in range(n):
```

```
C:\Users\Pruthviraj\PycharmProjects\assign3\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\assign3\select.py
Length of List: 5
Enter List Element: 44
Enter List Element: 20
Enter List Element: 91
Enter List Element: 26
Enter List Element: 39

List before Sorting:  [44, 20, 91, 26, 39]

List After Pass  1 :  [20, 44, 91, 26, 39]
List After Pass  2 :  [20, 26, 91, 44, 39]
List After Pass  3 :  [20, 26, 39, 44, 91]
List After Pass  4 :  [20, 26, 39, 44, 91]
List After Pass  5 :  [20, 26, 39, 44, 91]

Sorted List is: [20, 26, 39, 44, 91]

Process finished with exit code 0
```

Assignment No. 03(A star Algorithm)

Roll No. 335

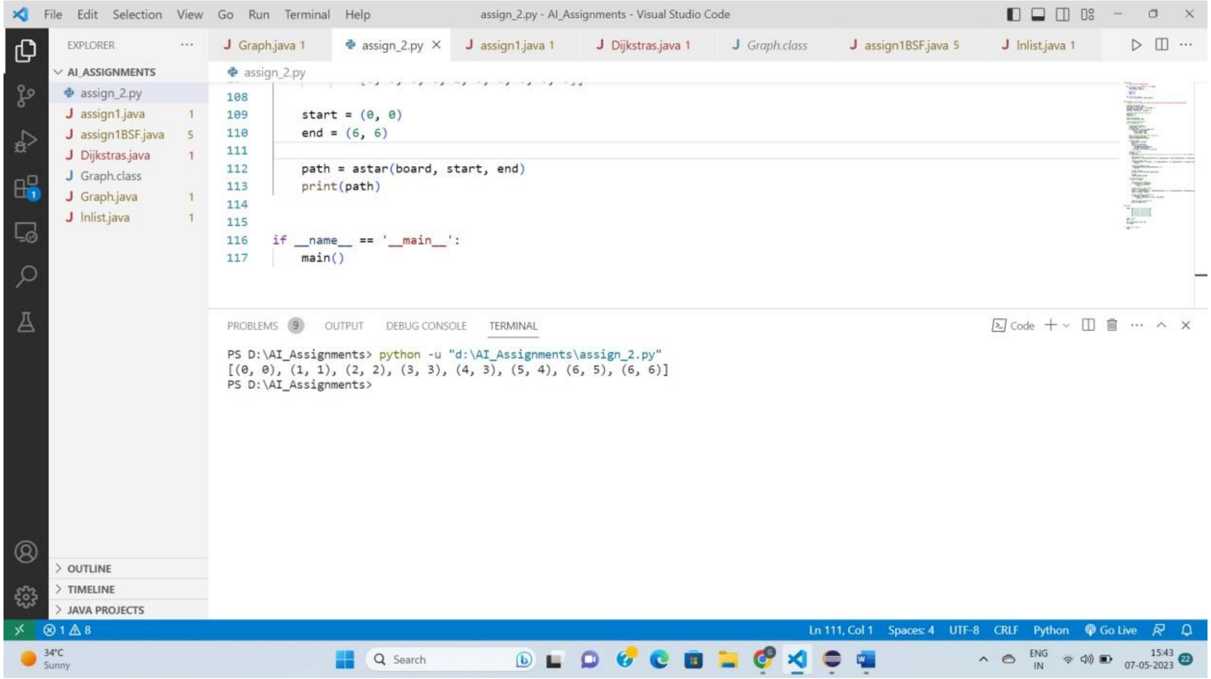
Batch: B

Code:

```
class box ( ):
    """A box class for A* Pathfinding"""

    def __init__(self, parent=None, position=None):
        self.parent = parent
        self.position = position
        self.g = 0
        self.h = 0
        self.f = 0

    def __eq__(self, other):
        return self.position == other.position


def astar(maze, start, end):
    """Returns a list of tuples as a path from the given start to the given
end in the given board"""

    # Create start and end node
    start_node = box (None, start)
    start_node.g = start_node.h = start_node.f = 0
    end_node = box (None, end)
    end_node.g = end_node.h = end_node.f = 0

    # Initialize both open and closed list
    open_list = []
    closed_list = []

    # Add the start node
    open_list.append (start_node)

    # Loop until you find the end
    while len (open_list) > 0:

        # Get the current node
        current_node = open_list[0]
        current_index = 0
        for index, item in enumerate (open_list):
            if item.f < current_node.f:
                current_node = item
                current_index = index

        # Pop current off open list, add to closed list
        open_list.pop (current_index)
        closed_list.append (current_node)

        # Found the goal
        if current_node == end_node:
            path = []
            current = current_node
            while current is not None:
                path.append (current.position)
                current = current.parent
            return path[::-1]  # Return reversed path

        # Generate children
        children = []
        for new_position in [(0, -1), (0, 1), (-1, 0), (1, 0), (-1, -1), (-1,
1), (1, -1), (1, 1)]:  # Adjacent squares

            # Get node position
            node_position = (current_node.position[0] + new_position[0],
current_node.position[1] + new_position[1])

            # Make sure within range
            if node_position[0] > (len (maze) - 1) or node_position[0] < 0 or
node_position[1] > (
                    len (maze[len (maze) - 1]) - 1) or node_position[1] < 0:
                continue

            # Make sure walkable terrain
            if maze[node_position[0]][node_position[1]] != 0:
                continue

            # Create new node
            new_node = box (current_node, node_position)

            # Append
            children.append (new_node)

        # Loop through children
        for child in children:

            # Child is on the closed list
            for closed_child in closed_list:
                if child == closed_child:
                    continue

            # Create the f, g, and h values
            child.g = current_node.g + 1
            child.h = ((child.position[0] - end_node.position[0]) ** 2) + (
                        (child.position[1] - end_node.position[1]) ** 2)
            child.f = child.g + child.h

            # Child is already in the open list
            for open_node in open_list:
                if child == open_node and child.g > open_node.g:
                    continue

            # Add the child to the open list
            open_list.append (child)
```

```
def main():
    board = [[0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
              [0, 0, 0, 0, 1, 0, 0, 0, 0, 0]]
    start = (0, 0)
    end = (6, 6)
    path = astar (board, start, end)
    print (path)
    if __name__ == '__main__':
      main ( )
```

Output:



```
    start = (0, 0)
    end = (6, 6)

    path = astar(board, start, end)
    print(path)


if __name__ == '__main__':
    main()
```

```
PS D:\AI_Assignments> python -u "d:\AI_Assignments\assign_2.py"
[(0, 0), (1, 1), (2, 2), (3, 3), (4, 3), (5, 4), (6, 5), (6, 6)]
PS D:\AI_Assignments>
```

Assignment No.5 (chatbot)

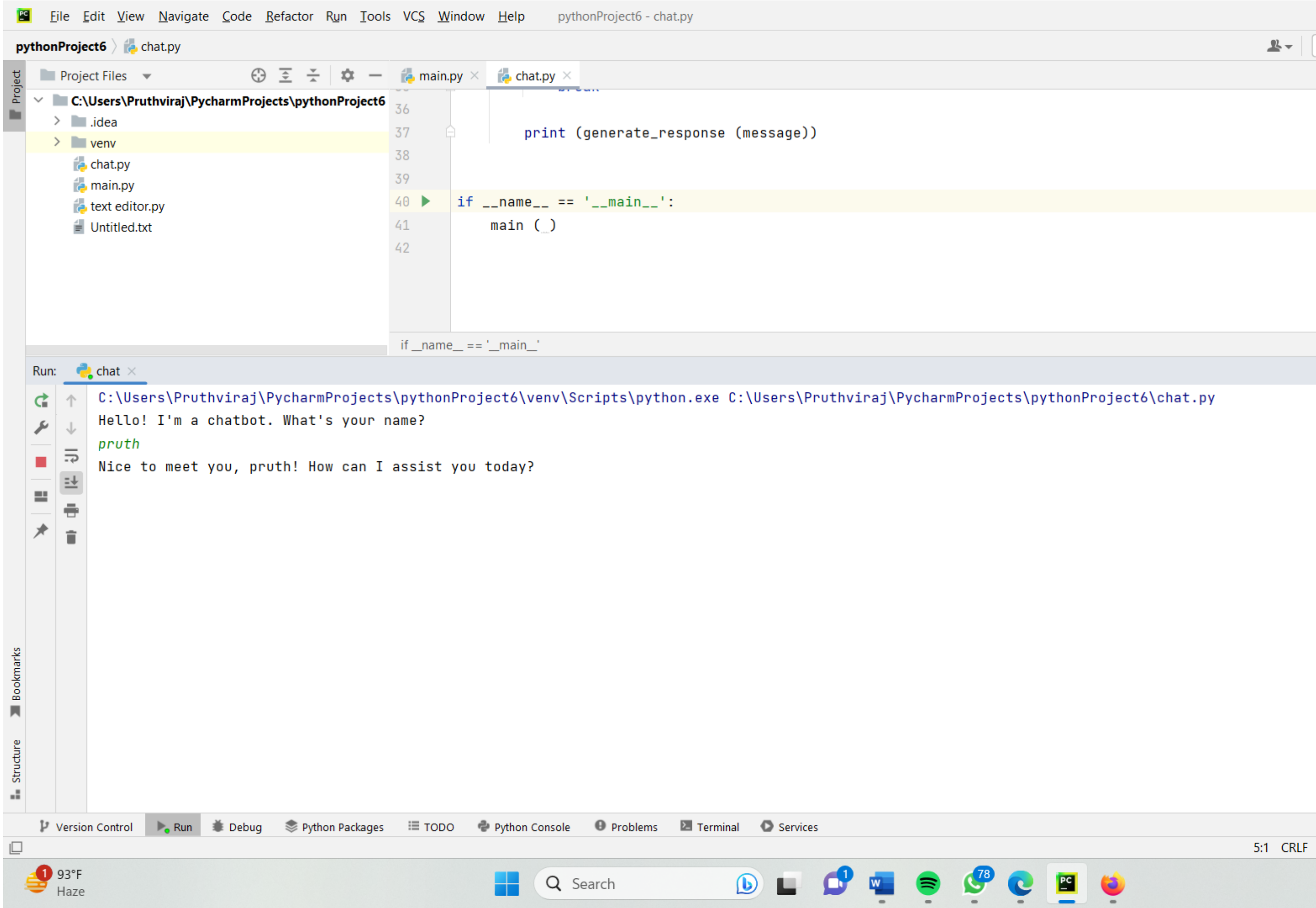
Roll No. 335

Batch: B

Code:

```
import random

# Define possible chatbot responses
responses = {
    "hello": ["Hi there!", "Hello!", "Hi!"],
    "how are you": ["I'm doing well, thank you!", "Great, thanks for
asking!", "I'm fine, how are you?"],
    "what's your name": ["My name is Chatbot!", "I'm Chatbot, nice to meet
you!"],
    "bye": ["Goodbye!", "See you later!", "Bye!"],
    "default": ["I'm sorry, I didn't understand that.", "Could you please
repeat that?"]
}


# Define function to generate chatbot response
def generate_response(message):
    message = message.lower ( )

    for key in responses:
        if key in message:
            return random.choice (responses[key])

    return random.choice (responses["default"])


# Define main function to handle user input and chatbot response
def main():
    print ("Hello! I'm a chatbot. What's your name?")
    name = input ( )
    print (f"Nice to meet you, {name}! How can I assist you today?")

    while True:
        message = input ( )

        if message.lower ( ) == "bye":
            print (generate_response ("bye"))
            break

        print (generate_response (message))


if __name__ == '__main__':
    main ( )
```

Output:



```
        print (generate_response (message))


if __name__ == '__main__':
    main ( )
```

```
C:\Users\Pruthviraj\PycharmProjects\pythonProject6\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\pythonProject6\chat.py
Hello! I'm a chatbot. What's your name?
pruth
Nice to meet you, pruth! How can I assist you today?
```

Assignment: 04(CSP N- queen problem)

Roll No: 335

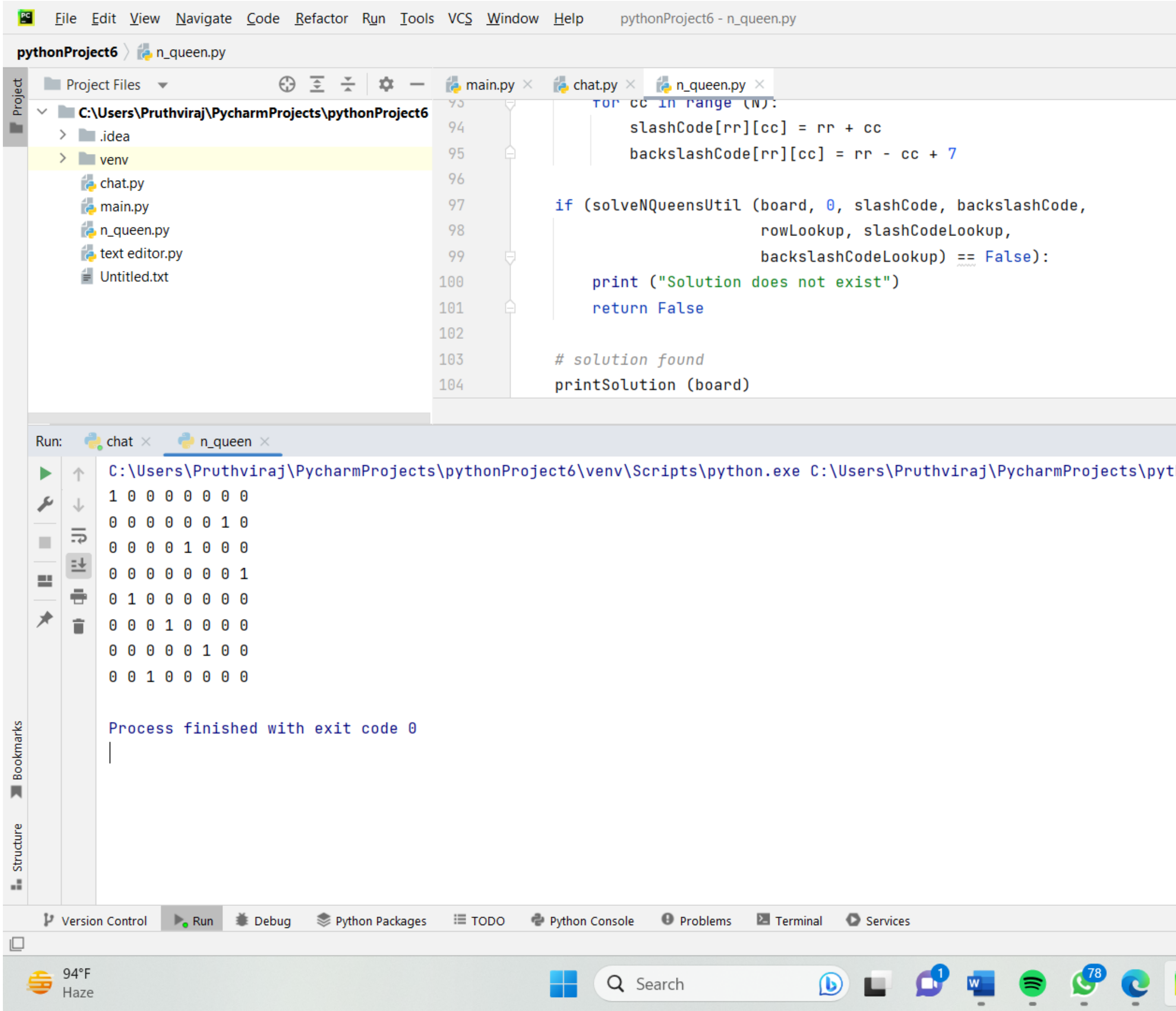
Batch: B

Code:

```
""" Python3 program to solve N Queen Problem
using Branch or Bound """

N = 8

""" A utility function to print solution """


def printSolution(board):
    for i in range (N):
        for j in range (N):
            print (board[i][j], end=" ")
        print ( )


""" A Optimized function to check if
a queen can be placed on board[row][col] """


def isSafe(row, col, slashCode, backslashCode,
           rowLookup, slashCodeLookup,
           backslashCodeLookup):
    if (slashCodeLookup[slashCode[row][col]] or
            backslashCodeLookup[backslashCode[row][col]] or
            rowLookup[row]):
        return False
    return True


""" A recursive utility function
to solve N Queen problem """


def solveNQueensUtil(board, col, slashCode, backslashCode,
                     rowLookup, slashCodeLookup,
                     backslashCodeLookup):
    """ base case: If all queens are
    placed then return True """
    if (col >= N):
        return True
    for i in range (N):
        if (isSafe (i, col, slashCode, backslashCode,
                    rowLookup, slashCodeLookup,
                    backslashCodeLookup)):

            """ Place this queen in board[i][col] """
            board[i][col] = 1
            rowLookup[i] = True
            slashCodeLookup[slashCode[i][col]] = True
            backslashCodeLookup[backslashCode[i][col]] = True

            """ recur to place rest of the queens """
            if (solveNQueensUtil (board, col + 1,
                                  slashCode, backslashCode,
                                  rowLookup, slashCodeLookup,
                                  backslashCodeLookup)):
                return True

            """ If placing queen in board[i][col]
            doesn't lead to a solution,then backtrack """

            """ Remove queen from board[i][col] """
            board[i][col] = 0
            rowLookup[i] = False
            slashCodeLookup[slashCode[i][col]] = False
            backslashCodeLookup[backslashCode[i][col]] = False

    """ If queen can not be place in any row in
    this column col then return False """
    return False

def solveNQueens():
    board = [[0 for i in range (N)]
             for j in range (N)]

    # helper matrices
    slashCode = [[0 for i in range (N)]
                 for j in range (N)]
    backslashCode = [[0 for i in range (N)]
                     for j in range (N)]

    # arrays to tell us which rows are occupied
    rowLookup = [False] * N

    # keep two arrays to tell us
    # which diagonals are occupied
    x = 2 * N - 1
    slashCodeLookup = [False] * x
    backslashCodeLookup = [False] * x

    # initialize helper matrices
    for rr in range (N):
        for cc in range (N):
            slashCode[rr][cc] = rr + cc
            backslashCode[rr][cc] = rr - cc + 7

    if (solveNQueensUtil (board, 0, slashCode, backslashCode,
                          rowLookup, slashCodeLookup,
                          backslashCodeLookup) == False):
        print ("Solution does not exist")
        return False

    # solution found
    printSolution (board)
    return True
```

```
# Driver Code
solveNQueens ( )

# This code is contributed by SHUBHAMSINGH10
```

OUTPUT:



```
        for cc in range (N):
            slashCode[rr][cc] = rr + cc
            backslashCode[rr][cc] = rr - cc + 7

    if (solveNQueensUtil (board, 0, slashCode, backslashCode,
                          rowLookup, slashCodeLookup,
                          backslashCodeLookup) == False):
        print ("Solution does not exist")
        return False

    # solution found
    printSolution (board)
```

```
C:\Users\Pruthviraj\PycharmProjects\pythonProject6\venv\Scripts\python.exe C:\Users\Pruthviraj\PycharmProjects\pyt
1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0
0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 1
0 1 0 0 0 0 0 0
0 0 0 1 0 0 0 0
0 0 0 0 0 1 0 0
0 0 1 0 0 0 0 0

Process finished with exit code 0
```