CS301P — Data Structures (Practical)

Assignment No. 1 — Fall 2026 | Sample Solution

```
#include <iostream>
using namespace std;

class Node {
public:
    int data;
    Node* next;

    Node(int value) {
        data = value;
        next = NULL;
    }
};

class NumberStack {
private:
    Node* top;

public:
    NumberStack() {
        top = NULL;
    }

    void push(int value) {
        Node* newNode = new Node(value);
        newNode->next = top;
        top = newNode;
    }

    int pop() {
        if (top == NULL) {
            return -1;
        }
        Node* temp = top;
        int value = temp->data;
        top = top->next;
        delete temp;
        return value;
    }

    bool isEmpty() {
        return top == NULL;
    }

    bool isPrime(int num) {
        if (num <= 1) {
            return false;
        }
        for (int i = 2; i * i <= num; i++) {
```

```
            if (num % i == 0) {
                return false;
            }
        }
        return true;
    }

    int countPrimes() {
        int count = 0;
        Node* current = top;
        while (current != NULL) {
            if (isPrime(current->data)) {
                count++;
            }
            current = current->next;
        }
        return count;
    }

    int sumPrimes() {
        int sum = 0;
        Node* current = top;
        while (current != NULL) {
            if (isPrime(current->data)) {
                sum += current->data;
            }
            current = current->next;
        }
        return sum;
    }

    void toBinary(int num) {
        NumberStack binaryStack;
        if (num == 0) {
            cout << 0;
            return;
        }
        while (num > 0) {
            binaryStack.push(num % 2);
            num = num / 2;
        }
        while (!binaryStack.isEmpty()) {
            cout << binaryStack.pop();
        }
    }
};

int main() {
    cout << "VU ID: BC123456789" << endl;

    NumberStack stack;
    stack.push(9);
    stack.push(18);
    stack.push(23);
```

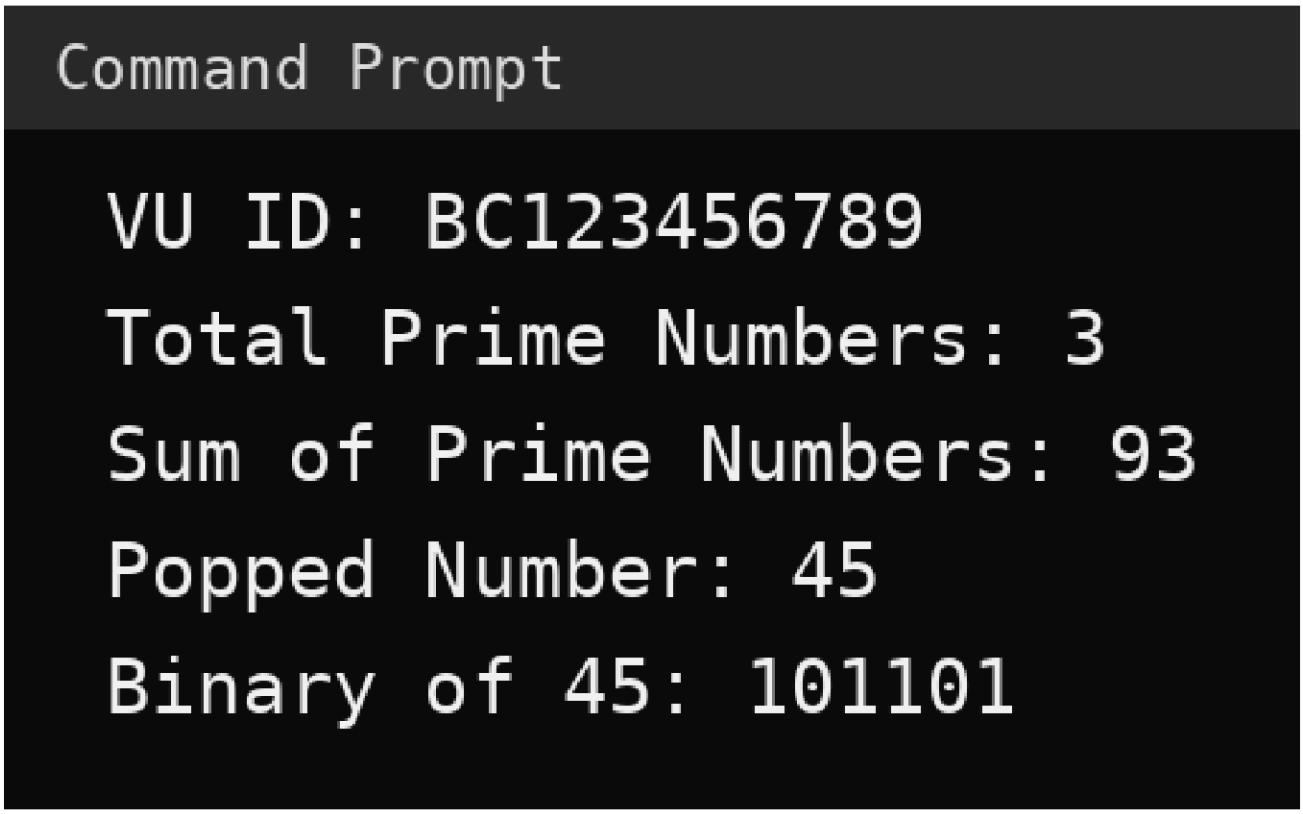
```
    stack.push(29);
    stack.push(41);
    stack.push(45);

    cout << "Total Prime Numbers: " << stack.countPrimes() << endl;
    cout << "Sum of Prime Numbers: " << stack.sumPrimes() << endl;

    int popped = stack.pop();
    cout << "Popped Number: " << popped << endl;
    cout << "Binary of " << popped << ": ";
    stack.toBinary(popped);
    cout << endl;

    return 0;
}
```

Output


Command Prompt
VU ID: BC123456789
Total Prime Numbers: 3
Sum of Prime Numbers: 93
Popped Number: 45
Binary of 45: 101101

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