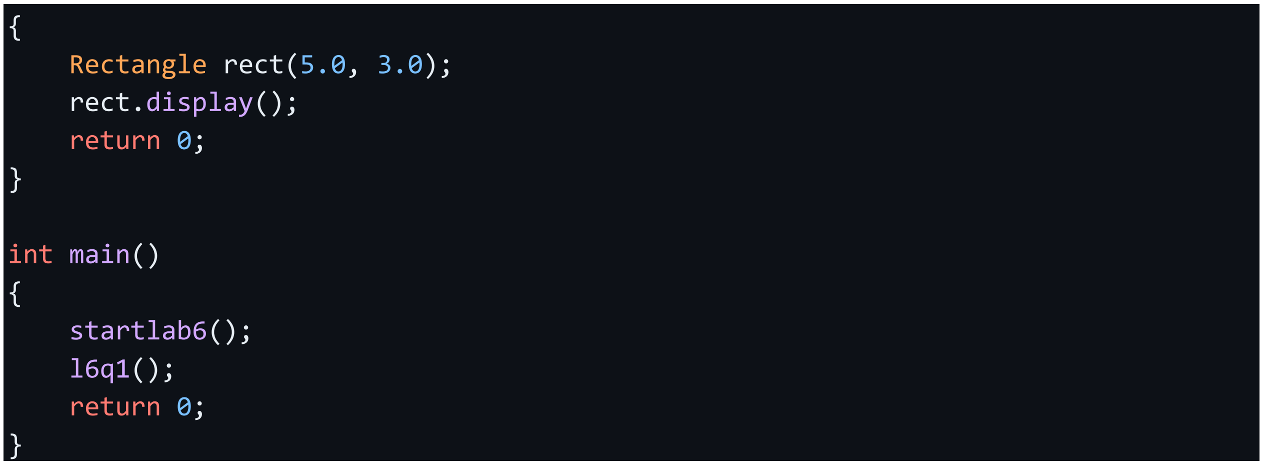
LAB SESSION 6

1. Question: Create a class Rectangle with attributes length and width. Implement methods to calculate the area and perimeter of the rectangle.

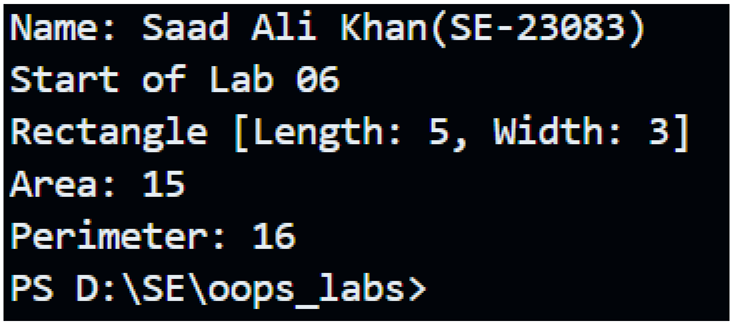
Code:

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

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Start of Lab 06" << endl;
    return 0;
}
class Rectangle
{
private:
    double length;
    double width;

public:
    Rectangle(double l, double w) : length(l), width(w) {}

    double area() const
    {
        return length * width;
    }

    double perimeter() const
    {
        return 2 * (length + width);
    }

    void display() const
    {
        cout << "Rectangle [Length: " << length << ", Width: " << width << "]" <<
endl;
        cout << "Area: " << area() << endl;
        cout << "Perimeter: " << perimeter() << endl;
    }
};

int l6q1()
```



```
{
    Rectangle rect(5.0, 3.0);
    rect.display();
    return 0;
}

int main()
{
    startlab6();
    l6q1();
    return 0;
}
```

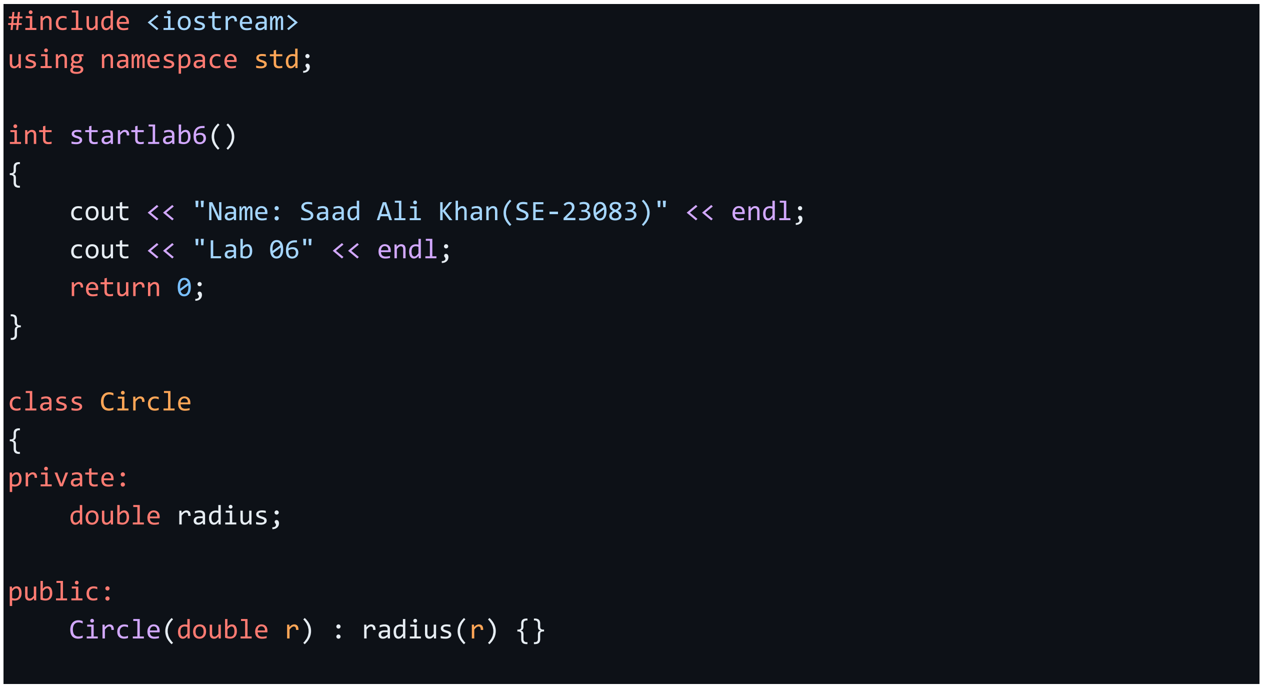
Output:



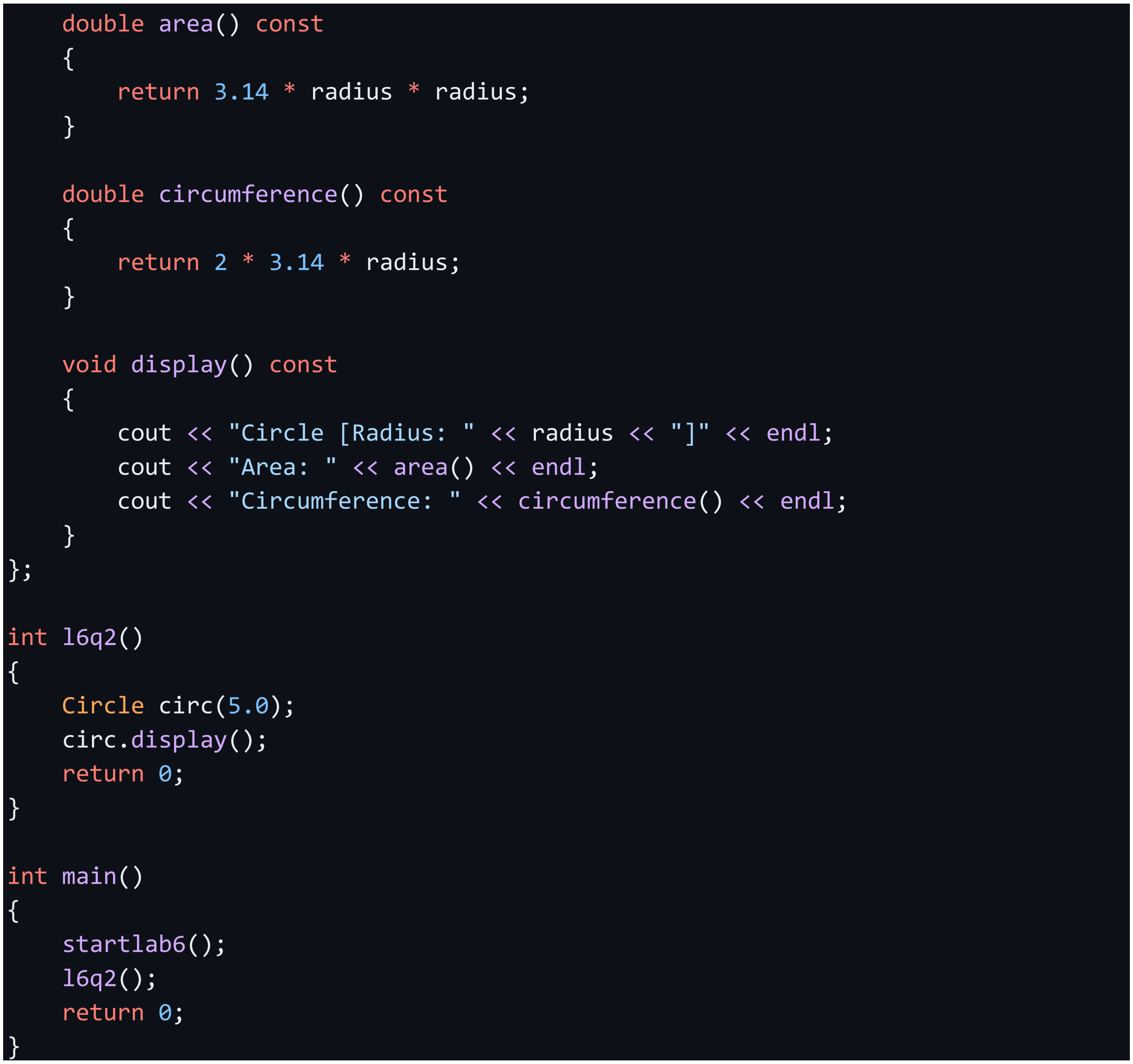
```
Name: Saad Ali Khan(SE-23083)
Start of Lab 06
Rectangle [Length: 5, Width: 3]
Area: 15
Perimeter: 16
PS D:\SE\oops_labs>
```

2. Question: Create a class Circle with attribute radius. Implement methods to calculate the area and circumference of the circle.

Code:

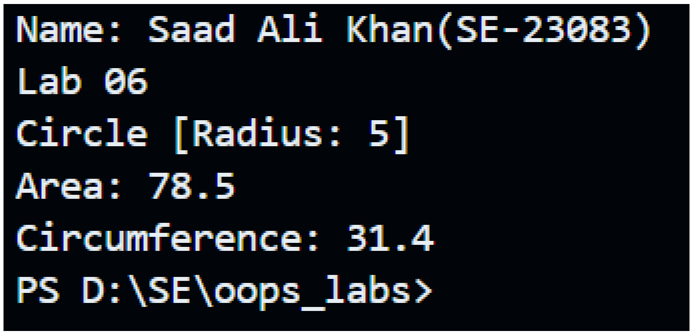


```
#include <iostream>
using namespace std;

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Lab 06" << endl;
    return 0;
}

class Circle
{
private:
    double radius;

public:
    Circle(double r) : radius(r) {}
```



```
    double area() const
    {
        return 3.14 * radius * radius;
    }

    double circumference() const
    {
        return 2 * 3.14 * radius;
    }

    void display() const
    {
        cout << "Circle [Radius: " << radius << "]" << endl;
        cout << "Area: " << area() << endl;
        cout << "Circumference: " << circumference() << endl;
    }
};

int l6q2()
{
    Circle circ(5.0);
    circ.display();
    return 0;
}

int main()
{
    startlab6();
    l6q2();
    return 0;
}
```

Output:



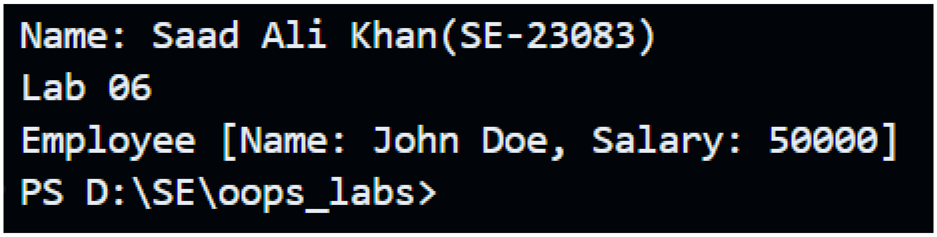
```
Name: Saad Ali Khan(SE-23083)
Lab 06
Circle [Radius: 5]
Area: 78.5
Circumference: 31.4
PS D:\SE\oops_labs>
```

3. Question: Create a class Employee with attributes name and salary. Implement a method to display the details of the employee.

Code:

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

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Lab 06" << endl;
    return 0;
}
class Employee
{
private:
    string name;
    double salary;

public:
    Employee(string n, double s) : name(n), salary(s) {}

    void display() const
    {
        cout << "Employee [Name: " << name << ", Salary: " << salary << "]" <<
endl;
    }
};

int l6q3()
{
    Employee emp("John Doe", 50000.0);
    emp.display();
    return 0;
}

int main()
{
    startlab6();
    l6q3();
    return 0;
}
```

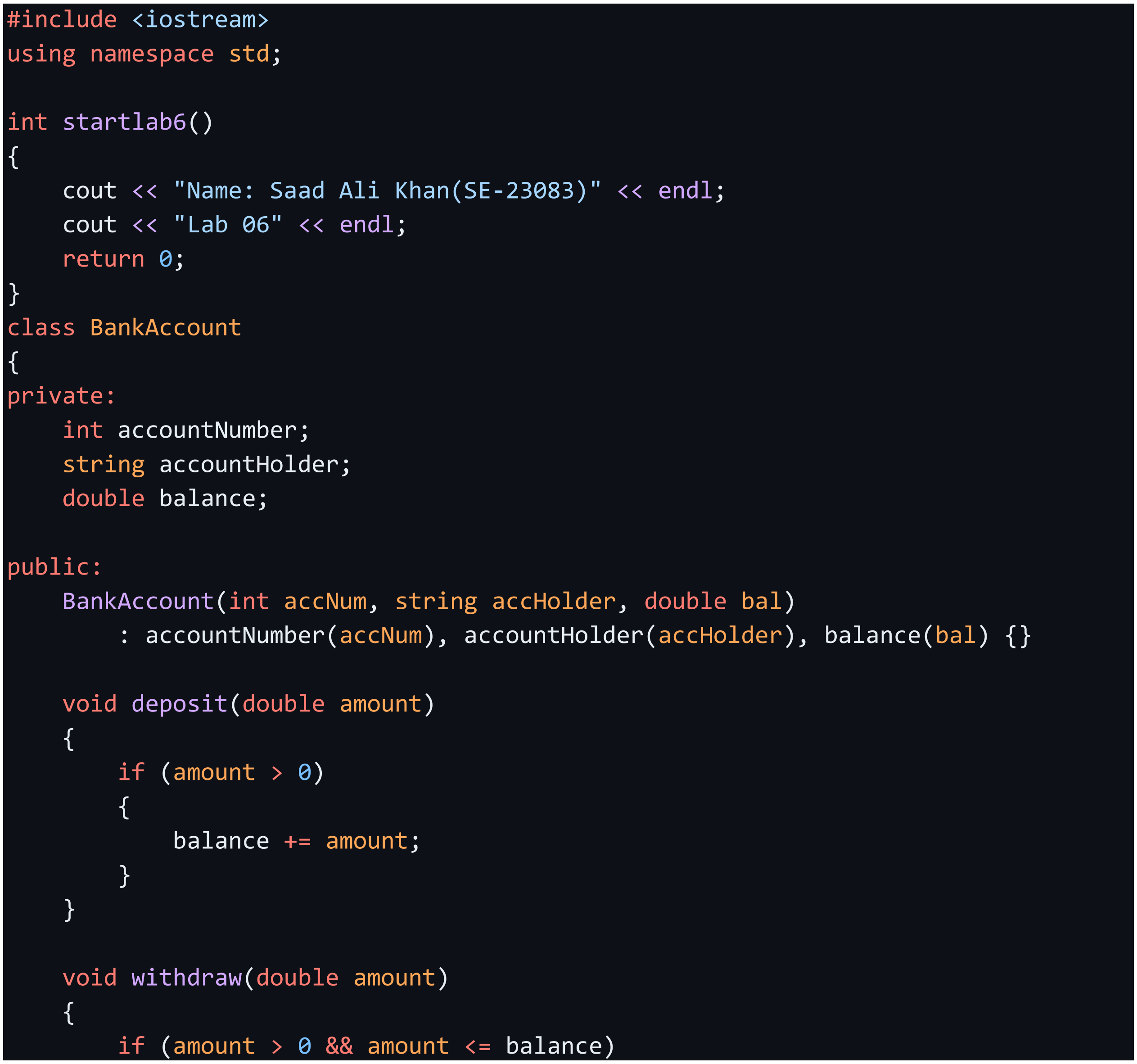
Output:



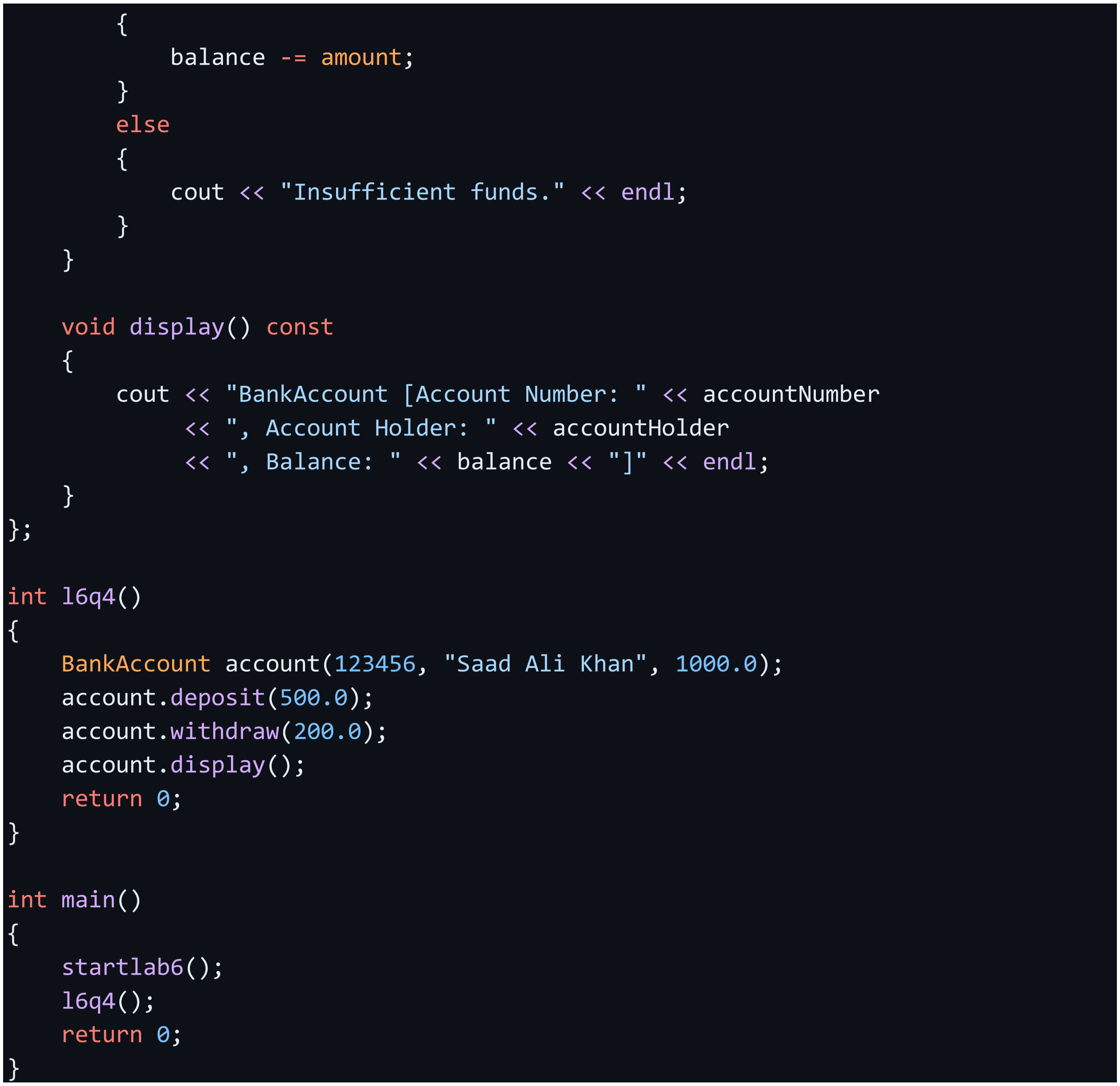
```
Name: Saad Ali Khan(SE-23083)
Lab 06
Employee [Name: John Doe, Salary: 50000]
PS D:\SE\oops_labs>
```

4. Question: Create a class BankAccount with attributes accountNumber, accountHolder, and balance. Implement methods to deposit and withdraw money from the account.

Code:

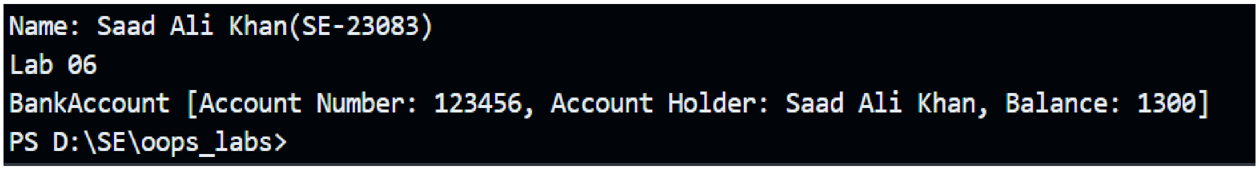


```cpp
#include <iostream>
using namespace std;

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Lab 06" << endl;
    return 0;
}
class BankAccount
{
private:
    int accountNumber;
    string accountHolder;
    double balance;

public:
    BankAccount(int accNum, string accHolder, double bal)
        : accountNumber(accNum), accountHolder(accHolder), balance(bal) {}

    void deposit(double amount)
    {
        if (amount > 0)
        {
            balance += amount;
        }
    }

    void withdraw(double amount)
    {
        if (amount > 0 && amount <= balance)
```



```
        {
            balance -= amount;
        }
        else
        {
            cout << "Insufficient funds." << endl;
        }
    }

    void display() const
    {
        cout << "BankAccount [Account Number: " << accountNumber
             << ", Account Holder: " << accountHolder
             << ", Balance: " << balance << "]" << endl;
    }
};

int l6q4()
{
    BankAccount account(123456, "Saad Ali Khan", 1000.0);
    account.deposit(500.0);
    account.withdraw(200.0);
    account.display();
    return 0;
}

int main()
{
    startlab6();
    l6q4();
    return 0;
}
```

Output:



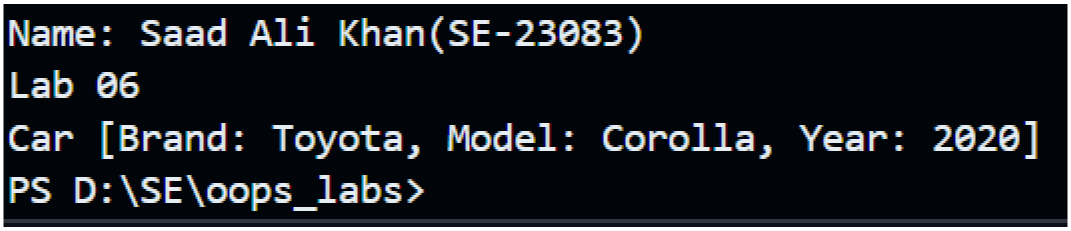
```
Name: Saad Ali Khan(SE-23083)
Lab 06
BankAccount [Account Number: 123456, Account Holder: Saad Ali Khan, Balance: 1300]
PS D:\SE\oops_labs>
```

5. Question: Create a class Car with attributes brand, model, and year. Implement a method to display the details of the car.

Code:

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

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Lab 06" << endl;
    return 0;
}

class Car
{
private:
    string brand;
    string model;
    int year;

public:
    Car(string b, string m, int y) : brand(b), model(m), year(y) {}

    void display() const
    {
        cout << "Car [Brand: " << brand << ", Model: " << model << ", Year: " <<
year << "]" << endl;
    }
};

int l6q5()
{
    Car car("Toyota", "Corolla", 2020);
    car.display();
    return 0;
}

int main()
{
    startlab6();
    l6q5();
    return 0;
}
```

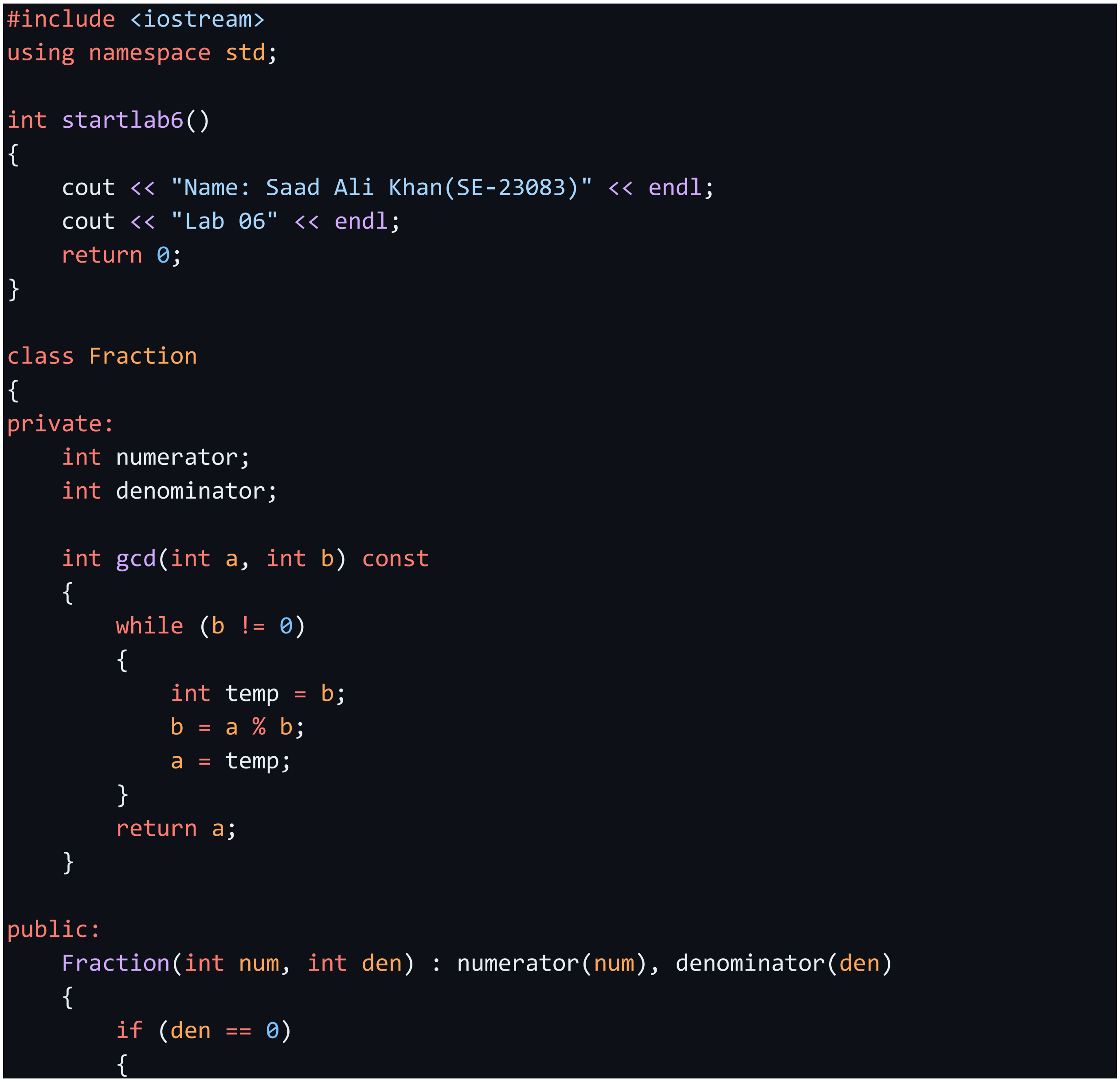
Output:



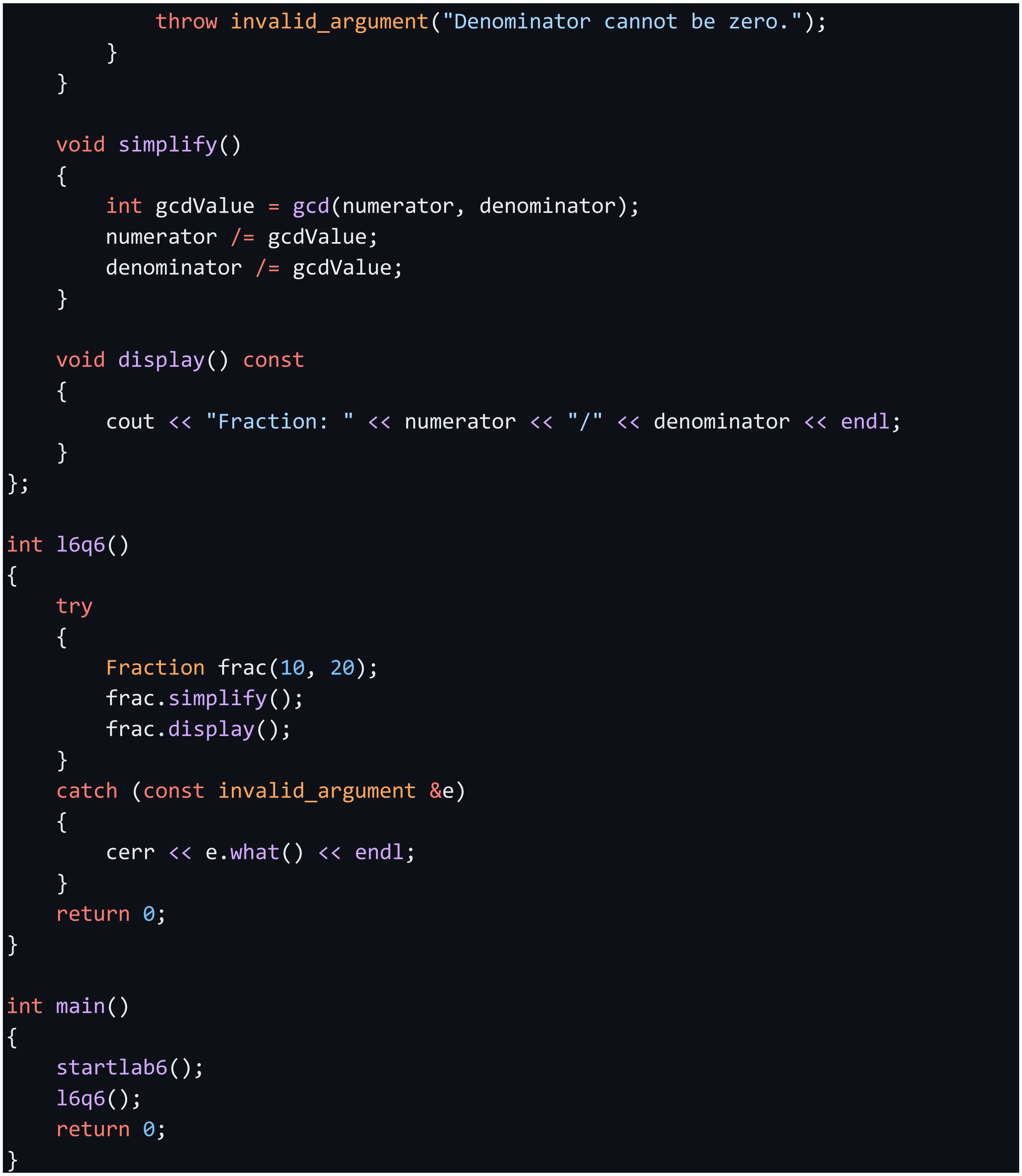
```
Name: Saad Ali Khan(SE-23083)
Lab 06
Car [Brand: Toyota, Model: Corolla, Year: 2020]
PS D:\SE\oops_labs>
```

6. Question: Create a class Fraction with attributes numerator and denominator. Implement a method to simplify the fraction.

Code:

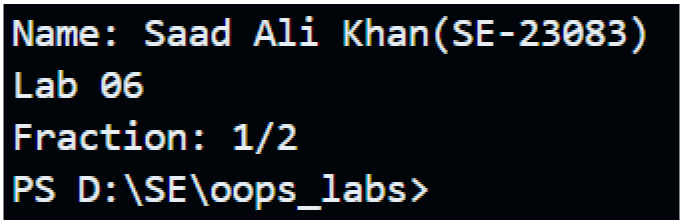


```cpp
#include <iostream>
using namespace std;

int startlab6()
{
    cout << "Name: Saad Ali Khan(SE-23083)" << endl;
    cout << "Lab 06" << endl;
    return 0;
}

class Fraction
{
private:
    int numerator;
    int denominator;

    int gcd(int a, int b) const
    {
        while (b != 0)
        {
            int temp = b;
            b = a % b;
            a = temp;
        }
        return a;
    }

public:
    Fraction(int num, int den) : numerator(num), denominator(den)
    {
        if (den == 0)
        {
```



```cpp
            throw invalid_argument("Denominator cannot be zero.");
        }
    }

    void simplify()
    {
        int gcdValue = gcd(numerator, denominator);
        numerator /= gcdValue;
        denominator /= gcdValue;
    }

    void display() const
    {
        cout << "Fraction: " << numerator << "/" << denominator << endl;
    }
};

int l6q6()
{
    try
    {
        Fraction frac(10, 20);
        frac.simplify();
        frac.display();
    }
    catch (const invalid_argument &e)
    {
        cerr << e.what() << endl;
    }
    return 0;
}

int main()
{
    startlab6();
    l6q6();
    return 0;
}
```

Output:



```
Name: Saad Ali Khan(SE-23083)
Lab 06
Fraction: 1/2
PS D:\SE\oops_labs>
```