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Individual Assessment Coversheet

To be attached to the front of the assessment.

Campus:	Midrand Campus
Faculty:	Information Technology
Module Code:	ITCPA1-44
Group:	1
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Indicate	Yes	No
Plagiarism report attached		

Declaration:

I declare that this assessment is my own original work except for source material explicitly acknowledged. I also declare that this assessment or any other of my original work related to it has not been previously, or is not being simultaneously, submitted for this or any other course. I am aware of the AI policy and acknowledge that I have not used any AI technology to generate or manipulate data, other than as permitted by the assessment instructions. I also declare that I am aware of the Institution's policy and regulations on honesty in academic work as set out in the Conditions of Enrolment, and of the disciplinary guidelines applicable to breaches of such policy and regulations.

Signature	**Date**
	05 November 2025

Lecturer's Comments:

Marks Awarded:	**%**

Signature	**Date**

QUESTION 1

```
#include <iostream>

#include <limits>

using namespace std;
```

```
int main() {
   int menuChoice;
   bool programRunning = true;

   while (programRunning) {
      cout <<
"\n============================================================\n";
      cout << "========== MATHEMATICS: NUMBER THEORY ================\n";
      cout << "==========       Types(Sets) of Numbers          ================\n";
      cout <<
"============================================================\n\n";
      cout << "What do you want to know about numbers (Enter corresponding
number)?:\n\n";
      cout << "[1] Is Number Positive/Negative\n";
      cout << "[2] Is Number Even/Odd\n";
      cout << "[3] Is Number Whole Or Rational\n";
      cout << "[0] Exit\n\n";
      cout << "Enter your choice: ";

      if (!(cin >> menuChoice)) {
         cin.clear();
         cin.ignore(numeric_limits<streamsize>::max(), '\n');
         cout << "\nError: Invalid input. Please enter a number between 0 and 3.\n";
         continue;
      }

      if (menuChoice < 0 || menuChoice > 3) {
         cout << "\nError: Invalid choice. Please select a valid menu option (0-3).\n";
         continue;
```

```
}

if (menuChoice == 1) {
   int number;
   char userDecision;
   bool continueOption = true;

   while (continueOption) {
      cout << "\n--- Checking if Number is Positive or Negative ---\n";
      cout << "Enter an integer number: ";

      if (!(cin >> number)) {
         cin.clear();
         cin.ignore(numeric_limits<streamsize>::max(), '\n');
         cout << "\nError: Invalid input. You must enter an integer number.\n";
         cout << "Do you want to try again? (Y/N) or press M for main menu: ";
         cin >> userDecision;

         if (userDecision == 'M' || userDecision == 'm') {
            continueOption = false;
         }
         continue;
      }

      if (number > 0) {
         cout << "\nResult: The number " << number << " is POSITIVE.\n";
      }
      else if (number < 0) {
```

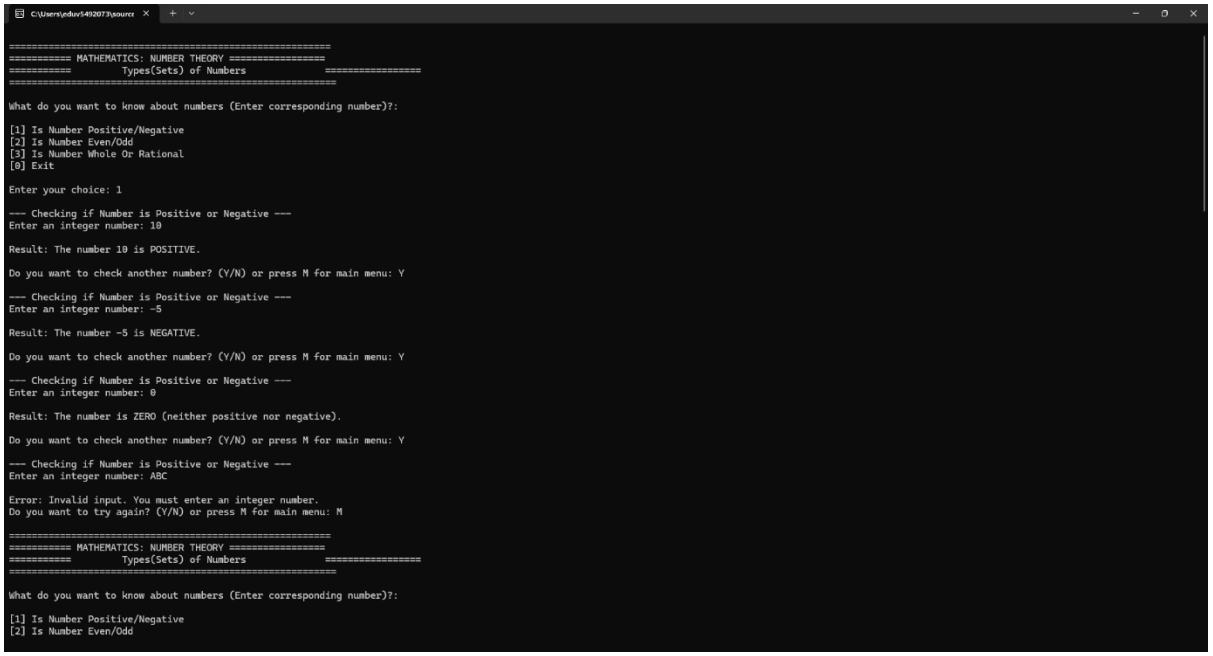
```
            cout << "\nResult: The number " << number << " is NEGATIVE.\n";
        }
        else {
            cout << "\nResult: The number is ZERO (neither positive nor negative).\n";
        }

        cout << "\nDo you want to check another number? (Y/N) or press M for main menu: ";
        cin >> userDecision;

        if (userDecision == 'N' || userDecision == 'n' || userDecision == 'M' || userDecision == 'm') {
            continueOption = false;
        }
      }
    }

    else if (menuChoice == 2) {
      int number;
      char userDecision;
      bool continueOption = true;

      while (continueOption) {
        cout << "\n--- Checking if Number is Even or Odd ---\n";
        cout << "Enter an integer number: ";

        if (!(cin >> number)) {
            cin.clear();
            cin.ignore(numeric_limits<streamsize>::max(), '\n');
```

```
            cout << "\nError: Invalid input. You must enter an integer number.\n";
            cout << "Do you want to try again? (Y/N) or press M for main menu: ";
            cin >> userDecision;

            if (userDecision == 'M' || userDecision == 'm') {
                continueOption = false;
            }
            continue;
        }

        if (number % 2 == 0) {
            cout << "\nResult: The number " << number << " is EVEN.\n";
        }
        else {
            cout << "\nResult: The number " << number << " is ODD.\n";
        }

        cout << "\nDo you want to check another number? (Y/N) or press M for main menu: ";
        cin >> userDecision;

        if (userDecision == 'N' || userDecision == 'n' || userDecision == 'M' || userDecision == 'm') {
            continueOption = false;
        }
    }
}

else if (menuChoice == 3) {
```

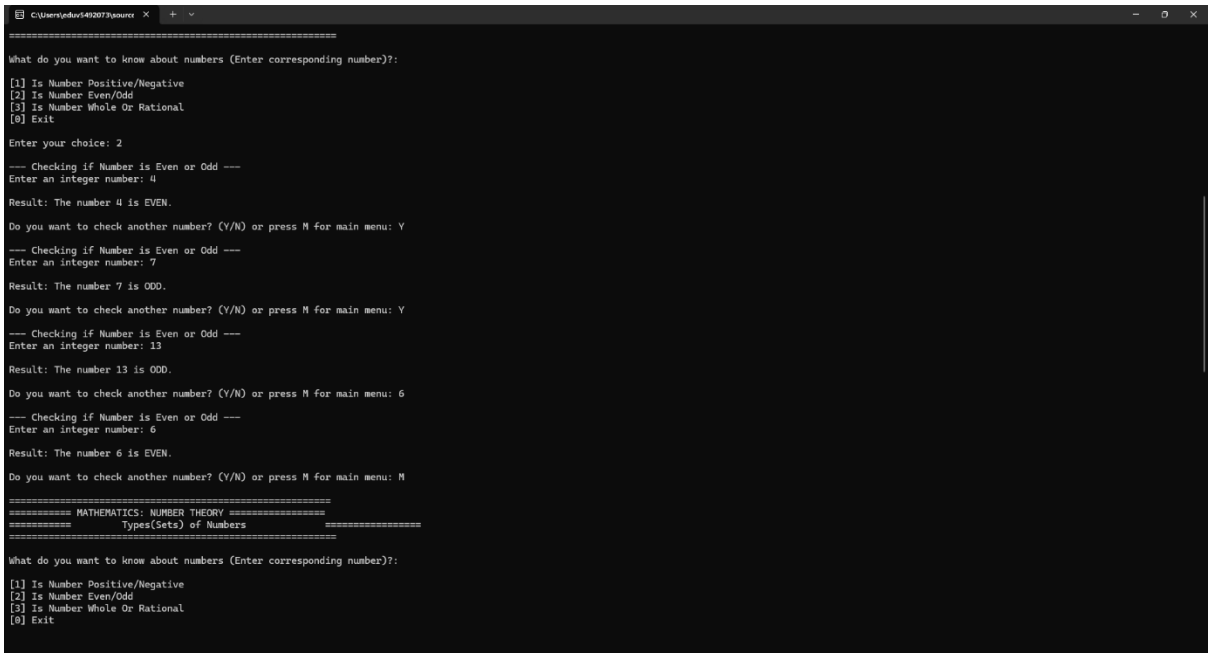
```
int numerator, denominator;
char userDecision;
bool continueOption = true;

while (continueOption) {
   cout << "\n--- Checking if Ratio is Whole or Rational ---\n";
   cout << "Enter the numerator (integer): ";

   if (!(cin >> numerator)) {
      cin.clear();
      cin.ignore(numeric_limits<streamsize>::max(), '\n');
      cout << "\nError: Invalid input. You must enter an integer number.\n";
      cout << "Do you want to try again? (Y/N) or press M for main menu: ";
      cin >> userDecision;

      if (userDecision == 'M' || userDecision == 'm') {
         continueOption = false;
      }
      continue;
   }

   cout << "Enter the denominator (non-zero integer): ";

   if (!(cin >> denominator)) {
      cin.clear();
      cin.ignore(numeric_limits<streamsize>::max(), '\n');
      cout << "\nError: Invalid input. You must enter an integer number.\n";
      cout << "Do you want to try again? (Y/N) or press M for main menu: ";
```

```
            cin >> userDecision;

            if (userDecision == 'M' || userDecision == 'm') {
                continueOption = false;
            }
            continue;
        }

        if (denominator == 0) {
            cout << "\nError: Denominator cannot be zero. Division by zero is
undefined.\n";
            cout << "Do you want to try again? (Y/N) or press M for main menu: ";
            cin >> userDecision;

            if (userDecision == 'M' || userDecision == 'm') {
                continueOption = false;
            }
            continue;
        }

        if (numerator % denominator == 0) {
            int result = numerator / denominator;
            cout << "\nResult: The ratio " << numerator << "/" << denominator;
            cout << " = " << result << " is a WHOLE NUMBER.\n";
        }
        else {
            double result = static_cast<double>(numerator) / denominator;
            cout << "\nResult: The ratio " << numerator << "/" << denominator;
```

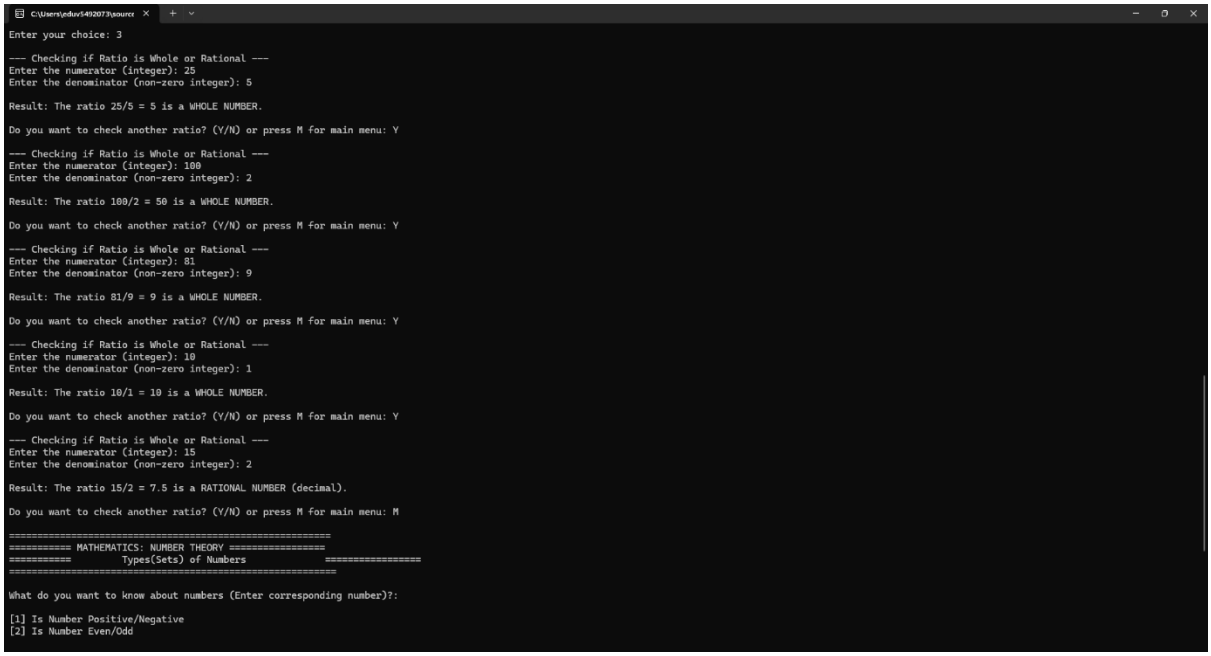
```
            cout << " = " << result << " is a RATIONAL NUMBER (decimal).\n";
        }

        cout << "\nDo you want to check another ratio? (Y/N) or press M for main menu:
";
        cin >> userDecision;

        if (userDecision == 'N' || userDecision == 'n' || userDecision == 'M' ||
userDecision == 'm') {
            continueOption = false;
        }
      }
    }

    else if (menuChoice == 0) {
      cout << "\nThank you for using the Number Theory application. Goodbye!\n";
      programRunning = false;
    }
  }

  return 0;
}
```

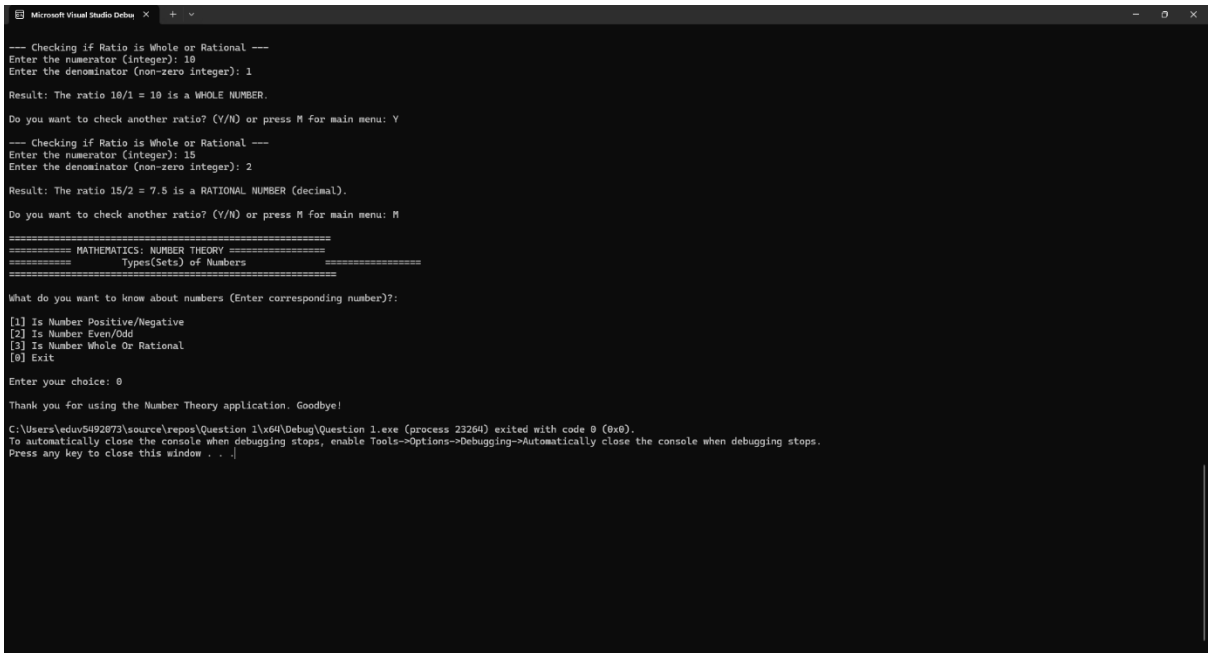


```
C:\Users\eduv5492073\source

==================================================
========== MATHEMATICS: NUMBER THEORY ================
==========         Types(Sets) of Numbers             ================
==================================================

What do you want to know about numbers (Enter corresponding number)?:

[1] Is Number Positive/Negative
[2] Is Number Even/Odd
[3] Is Number Whole Or Rational
[0] Exit

Enter your choice: 1

--- Checking if Number is Positive or Negative ---
Enter an integer number: 10

Result: The number 10 is POSITIVE.

Do you want to check another number? (Y/N) or press M for main menu: Y

--- Checking if Number is Positive or Negative ---
Enter an integer number: -5

Result: The number -5 is NEGATIVE.

Do you want to check another number? (Y/N) or press M for main menu: Y

--- Checking if Number is Positive or Negative ---
Enter an integer number: 0

Result: The number is ZERO (neither positive nor negative).

Do you want to check another number? (Y/N) or press M for main menu: Y

--- Checking if Number is Positive or Negative ---
Enter an integer number: ABC

Error: Invalid input. You must enter an integer number.
Do you want to try again? (Y/N) or press M for main menu: M

==================================================
========== MATHEMATICS: NUMBER THEORY ================
==========         Types(Sets) of Numbers             ================
==================================================

What do you want to know about numbers (Enter corresponding number)?:

[1] Is Number Positive/Negative
[2] Is Number Even/Odd
```



```
C:\Users\eduv5492073\source

==================================================

What do you want to know about numbers (Enter corresponding number)?:

[1] Is Number Positive/Negative
[2] Is Number Even/Odd
[3] Is Number Whole Or Rational
[0] Exit

Enter your choice: 2

--- Checking if Number is Even or Odd ---
Enter an integer number: 4

Result: The number 4 is EVEN.

Do you want to check another number? (Y/N) or press M for main menu: Y

--- Checking if Number is Even or Odd ---
Enter an integer number: 7

Result: The number 7 is ODD.

Do you want to check another number? (Y/N) or press M for main menu: Y

--- Checking if Number is Even or Odd ---
Enter an integer number: 13

Result: The number 13 is ODD.

Do you want to check another number? (Y/N) or press M for main menu: 6

--- Checking if Number is Even or Odd ---
Enter an integer number: 6

Result: The number 6 is EVEN.

Do you want to check another number? (Y/N) or press M for main menu: M

==================================================
========== MATHEMATICS: NUMBER THEORY ================
==========         Types(Sets) of Numbers             ================
==================================================

What do you want to know about numbers (Enter corresponding number)?:

[1] Is Number Positive/Negative
[2] Is Number Even/Odd
[3] Is Number Whole Or Rational
[0] Exit
```





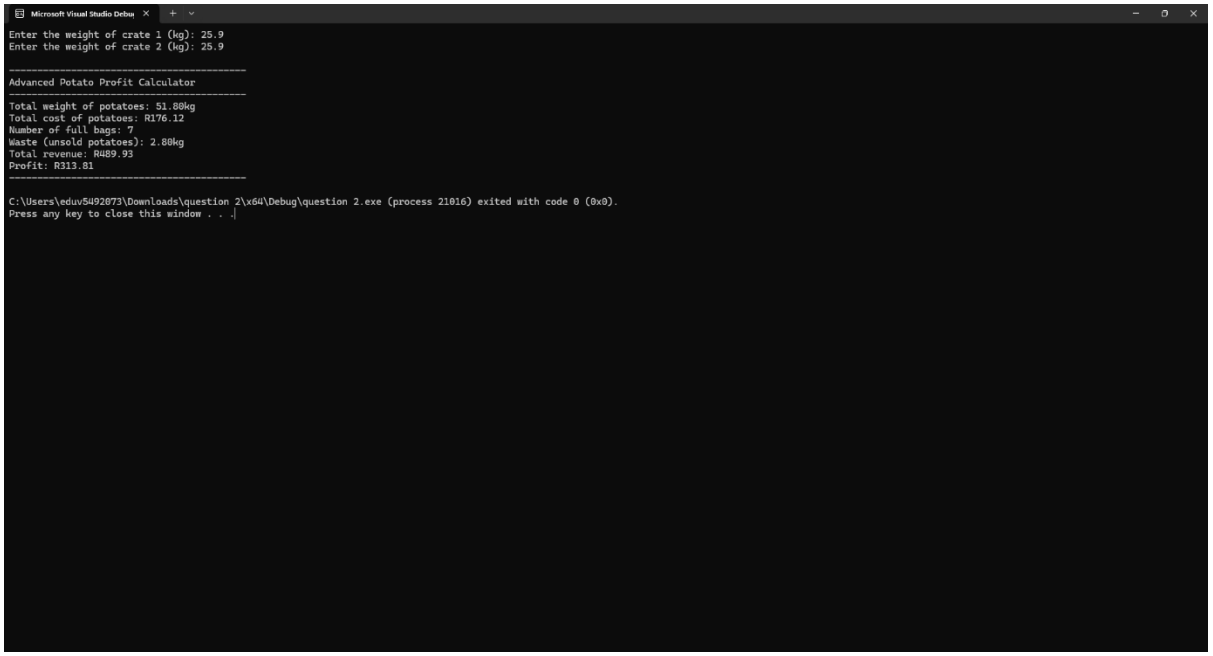
QUESTION 2

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

// Constants
const double COST_PER_KG = 3.40;
```

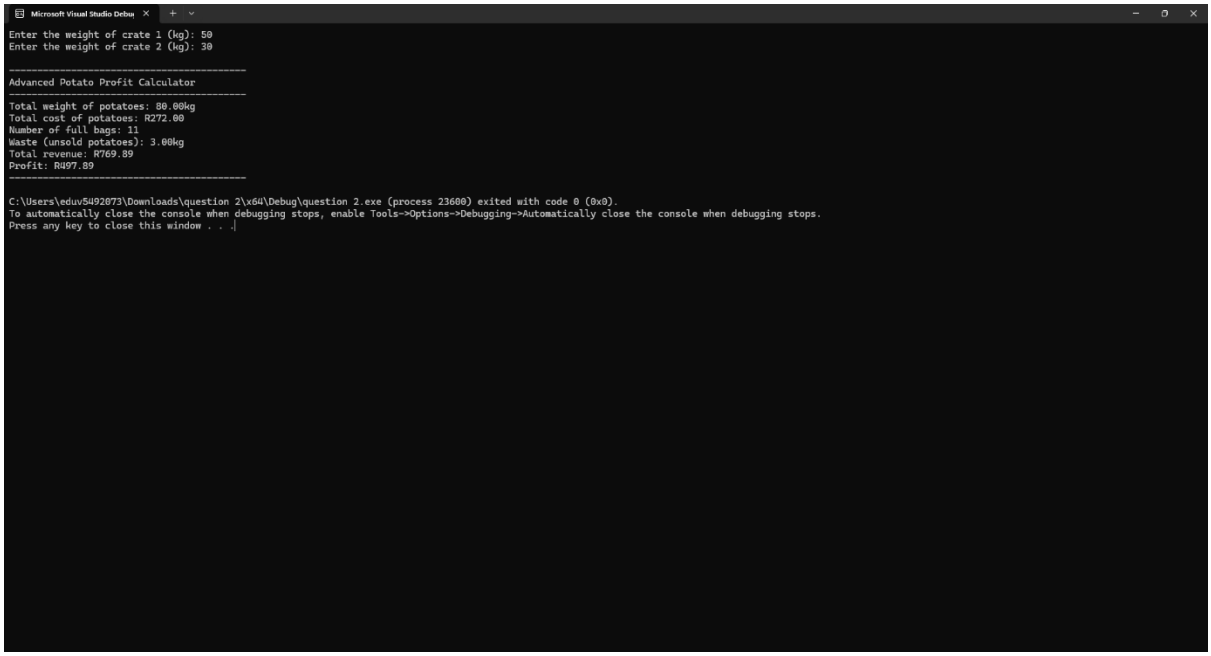
```
const double BAG_PRICE = 69.99;
const int BAG_WEIGHT = 7;

// Function to calculate total weight
double calculateTotalWeight(double crate1, double crate2) {
   return crate1 + crate2;
}

// Function to calculate total cost
double calculateTotalCost(double totalWeight) {
   return totalWeight * COST_PER_KG;
}

// Function to calculate number of full bags
int calculateFullBags(double totalWeight) {
   return static_cast<int>(totalWeight / BAG_WEIGHT);
}

// Function to calculate waste
double calculateWaste(double totalWeight, int fullBags) {
   return totalWeight - (fullBags * BAG_WEIGHT);
}

// Function to calculate revenue
double calculateRevenue(int fullBags) {
   return fullBags * BAG_PRICE;
}
```

```
// Function to calculate profit
double calculateProfit(double revenue, double totalCost) {
   return revenue - totalCost;
}

// Function to display results
void displayResults(double totalWeight, double totalCost, int fullBags,
   double waste, double revenue, double profit) {
   cout << fixed << setprecision(2);
   cout << "\n----------------------------------------\n";
   cout << "Advanced Potato Profit Calculator\n";
   cout << "----------------------------------------\n";
   cout << "Total weight of potatoes: " << totalWeight << "kg\n";
   cout << "Total cost of potatoes: R" << totalCost << "\n";
   cout << "Number of full bags: " << fullBags << "\n";
   cout << "Waste (unsold potatoes): " << waste << "kg\n";
   cout << "Total revenue: R" << revenue << "\n";
   cout << "Profit: R" << profit << "\n";
   cout << "----------------------------------------\n";
}

int main() {
   double crate1, crate2;

   cout << "Enter the weight of crate 1 (kg): ";

   // Input validation for crate 1
   while (!(cin >> crate1) || crate1 <= 0) {
```

```
        cin.clear();
        cin.ignore(10000, '\n');
        cout << "Invalid input. Please enter a positive number for crate 1: ";
    }

    cout << "Enter the weight of crate 2 (kg): ";

    // Input validation for crate 2
    while (!(cin >> crate2) || crate2 <= 0) {
        cin.clear();
        cin.ignore(10000, '\n');
        cout << "Invalid input. Please enter a positive number for crate 2: ";
    }

    // Calculate values using functions
    double totalWeight = calculateTotalWeight(crate1, crate2);
    double totalCost = calculateTotalCost(totalWeight);
    int fullBags = calculateFullBags(totalWeight);
    double waste = calculateWaste(totalWeight, fullBags);
    double revenue = calculateRevenue(fullBags);
    double profit = calculateProfit(revenue, totalCost);

    // Display results
    displayResults(totalWeight, totalCost, fullBags, waste, revenue, profit);

    return 0;
}
```


Microsoft Visual Studio Debu
Enter the weight of crate 1 (kg): 25.9
Enter the weight of crate 2 (kg): 25.9
Advanced Potato Profit Calculator
Total weight of potatoes: 51.80kg
Total cost of potatoes: R176.12
Number of full bags: 7
Waste (unsold potatoes): 2.80kg
Total revenue: R489.93
Profit: R313.81
C:\Users\eduv5492073\Downloads\question 2\x64\Debug\question 2.exe (process 21016) exited with code 0 (0x0).
Press any key to close this window . . .


C:\Users\eduv5492073\Downl
Enter the weight of crate 1 (kg): -5
Invalid input. Please enter a positive number for crate 1: ABC
Invalid input. Please enter a positive number for crate 1: 0
Invalid input. Please enter a positive number for crate 1:



QUESTION 3

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

int main()
{
   double grossSalary, debitOrders, paye, netSalary, taxRate;

   cout << "Enter Monthly Gross Salary Amount (ZAR): ";
   cin >> grossSalary;

   while (grossSalary <= 0)
   {
      cout << "Invalid input. Enter a positive value: ";
      cin >> grossSalary;
```

```
}

cout << "Enter amount for Monthly Debit Order Deductions (ZAR): ";
cin >> debitOrders;

while (debitOrders < 0)
{
   cout << "Invalid input. Enter a positive value or zero: ";
   cin >> debitOrders;
}

if (grossSalary <= 19750)
{
   taxRate = 18.0;
   paye = grossSalary * 0.18;
}
else if (grossSalary <= 30875)
{
   taxRate = 26.0;
   paye = grossSalary * 0.26;
}
else
{
   taxRate = 31.0;
   paye = grossSalary * 0.31;
}

netSalary = grossSalary - paye - debitOrders;
```

```
    cout << fixed << setprecision(2);
    cout << "\n========= NET SALARY Monthly Report =========" << endl;
    cout << "\n---------------------------------------------" << endl;
    cout << "Gross Salary:       R " << setw(10) << grossSalary << endl;
    cout << "PAYE (" << taxRate << " %):     R " << setw(10) << paye << endl;
    cout << "Debit Orders:       R " << setw(10) << debitOrders << endl;
    cout << "---------------------------------------------" << endl;
    cout << "NET SALARY:         R " << setw(10) << netSalary << endl;
    cout << "---------------------------------------------" << endl;
    cout << "---------------------------------------------" << endl;

    return 0;
}
```