National University of Computer and Emerging Sciences, Lahore Campus

Course:	**Programming Fundamentals**	**Course Code:**	**CS1002**
Program:	**BS(Computer Science)**	**Semester:**	**Fall 2023**
Duration:	**N/A**	**Total Marks:**	**70**
Due Date:	**September 20, 2023**	**CLO**	**3**
Section:	**1K**	**Page(s):**	**4**
Exam:	**Assignment 2**	**Roll No.**	

Instructions:

- *Late submissions will lead to negative marking and submissions after 20 hours past the due time will not be accepted.*
- *This is an individual assignment and the solution submitted must be your own.*
- *Any sort of plagiarism will be dealt with seriously and may lead to severe consequences including negative marking.*
- *Submit .cpp files named as XXL-XXXX_Q#X.cpp*
  i.e [your roll number]_[question number].cpp

QUESTION#1: ATM Withdrawal (8)

Write a C++ program for an ATM withdrawal system that receives the account balance and the amount to withdraw as input. The program should calculate and print whether the withdrawal is possible and the remaining balance based on the following conditions:

- The account balance must be greater than or equal to the withdrawal amount.
- If the withdrawal amount is greater than the account balance, display an error message.
- If the withdrawal amount is valid, deduct the amount from the account balance.
- Implement proper error handling for invalid inputs (e.g. negative values).

Sample Input & output:

1. Enter account balance: 1500
   Enter amount to withdraw: 800
   Withdrawal successful!
   Remaining balance: 700
2. Enter account balance: 200
   Enter amount to withdraw: 500
   Insufficient funds. Withdrawal not possible!

QUESTION#2: Online Shopping Cart (20)

Write a C++ program for an online shopping cart that calculates the total cost of items in the cart, including discounts and shipping charges, based on the following rules:

- Ask the user to input the total number of items in the cart.
- For each item, ask the user to input the item's price, and quantity.

- Calculate the subtotal. (Sum of [price * quantity] for each item.)
- Apply a 10% discount on the subtotal if the total cost of items is greater than 1000.
- Add a flat shipping fee of Rs. 50 if the total cost of items is less than 500; otherwise, shipping is free.
- Display the subtotal, discount amount, shipping fee, and the final total cost.
- Implement proper error handling for invalid inputs.

Sample Input & Output:

1. Enter the total number of items in the cart: 3

   Item 1:
   Price (Rs.): 50000
   Quantity: 1

   Item 2:
   Price (Rs.): 15000
   Quantity: 2

   Item 3:
   Price (Rs.): 1000
   Quantity: 3

   Itemized List:
   Subtotal : Rs. 83000
   Discount (10%) : Rs. 8300
   Shipping Fee : Rs. 0
   Total Cost : Rs. 74700

2. Enter the total number of items in the cart: 1

   Item 1:
   Price (Rs.): 300
   Quantity: 1

   Itemized List:
   Subtotal : Rs. 300
   Shipping Fee : Rs. 50
   Total Cost : Rs. 350

QUESTION#3: Body Fat (20)

One way to determine how healthy a person is by measuring the body fat of the person. Write a program to calculate the body fat of a person. The formulas to determine the body fat for female and male are as follows:

- **Body fat formula for women:**
  A1 = (body weight x 0.732) + 8.987
  A2 = wrist measurement (at fullest point) / 3.140

A3 = waist measurement (at navel) × 0.157
A4 = hip measurement (at fullest point) × 0.249
A5 = forearm measurement (at fullest point) × 0.434
B = A1 + A2 - A3 - A4 + A5
Body fat = body weight - B
Body fat percentage = body fat * 100 / body weight

- **Body fat formula for men:**
  A1 = (body weight x 1.082) + 9.442
  A2 = wrist measurement × 4.15
  B = A1 - A2
  Body fat = body weight - B
  Body fat percentage = body fat x 100 / body weight

Sample Input & Output:

- Enter gender (M/F): F

  Body weight: 140 pounds
  Wrist measurement: 6.5 inches
  Waist measurement: 28 inches
  Hip measurement: 38 inches
  Forearm measurement: 9 inches

  Body Fat Calculation:
  Body fat: 36.41 pounds
  Body fat percentage: 26.01%

- Enter gender (M/F): M

  Body weight: 180 pounds
  Wrist measurement: 7.0 inches

  Body Fat Calculation:
  Body fat: 4.84 pounds
  Body fat percentage: 2.69 %

QUESTION#4: Rock Scissor and Paper (15)

Have you ever heard of Rock Scissors and Paper? Alright, let's develop that game in C++ using if and else only. In this game, two players simultaneously say (or display a hand symbol Representing) either "rock", "paper," or "scissors." The winner is the one whose choice dominates the other.

- Assume Paper is represented by 1, Rock is 2 and Scissors is 3.
- You will take two numbers as input and return who is the winner.

Sample Input & output:

1. Enter the first player's choice (1 for Paper, 2 for Rock, 3 for Scissors): 1
   Enter the first player's choice (1 for Paper, 2 for Rock, 3 for Scissors):1
   This is Draw.

2. Enter the first player's choice (1 for Paper, 2 for Rock, 3 for Scissors):2
   Enter the first player's choice (1 for Paper, 2 for Rock, 3 for Scissors):3
   Player 1 wins

QUESTION#5: Shoe Brand (7)

Each item in Hush Puppies Shoe Brand has a code that identifies the location of warehouse in which it is stored. The valid codes and the location of their corresponding warehouses shown below. The shop's Owner wants to display the location, given the item code. If the item code not listed here than its display "Invalid Code" message.

Item Code	**Location**
12-40	Lahore
41-50	Islamabad
51-70	Karachi

Sample Input & output:

1. Enter Item Code: 24
   Location is Lahore

2. Enter Item Code: 92
   Invalid Code!