National University of Computer and Emerging Sciences, Lahore Campus

Programming Fundamentals

Total Marks: 40

Section: BSE-1A, BSE-1B **Due Date:** 22nd September 2022

Instructions:

Please read the following instructions carefully before submitting the assignment.

1. Follow TA's instructions for submission
2. It should be clear that your assignment will not get any credit if:
    - The assignment is submitted after due date.
    - Assignment is copied(partial or full) from any source (websites, forums, students, etc)

Objective:

The objective of this assignment is to provide an on-hand experience of:

1. Learn to use relational and logical operators in C++ program.
2. Learn to use if-else, if-else-if, nested-if, switch and conditional Operators

Guidelines:

1. Code should properly be indented and well commented.
2. Follow C/C++ naming conventions while using variables etc.

Assignment Description:

TASK 1:

Write a C++ program that calculates and displays a person's body mass index (BMI). The BMI is often used to determine whether a person with a sedentary lifestyle is overweight or underweight for his or her height. A person's BMI is calculated with the following formula: $BMI=weight \times 703/height^2$ where weight is measured in pounds and height is measured in inches. The program should display a message indicating whether the person has optimal weight, is underweight, or is overweight. A sedentary person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI value is greater than 25, the person is considered to be overweight.

TASK 2:

You have to develop a restaurant order payment application. For Example, your restaurant is offering the following meals.

Code	Meal	Per kg Price in Pakistani rupees
1	Chicken Handi	1800
2	Chicken Karahi	2000
3	Chicken Tikka	2200
4	Chicken Haleem	500
5	Creamy Chicken	2500

Your program should print the name of dishes along with their corresponding codes so that a user can select one of the dishes by using its code. For example, if the user selects code 1, then it means Chicken Handi, 2 means Chicken Karahi, so on and so forth. If the user has entered an invalid code, your program will print some error message and terminate.

After the user has been asked the dish that he wants to buy, your program will ask the user to enter the quantity of the dish that he wants to buy in kilograms. The quantity will be greater than 0. If the user has entered an invalid quantity, then print some error message and terminate the program. After that, the program should ask from the user about currency in which he/she wants to give payment. For this assignment, you are required to use three currencies. One is Pakistani rupee, second is dollar and the last one is euro. Use 1 for Pakistani rupee, 2 for euro, and 3 for dollar. If the user has entered an invalid option, then your program will print some error message and terminate.

After that, your program will calculate the meal price, sales tax on the meal price and total price of the meal (calculated after adding meal price and sales tax).

For calculating sales tax, you can use meal price in rupees which is hard coded in this case, and calculate sales tax on it using the table given below.

Meal Price	Sales Tax applicable
Less than or equal to 1000	No sales Tax on it.
Greater than 1000 and less than or equal to 3000	2% of meal price.
Greater than 3000	5% of meal price.

After calculating the sales tax, the program will calculate the total amount or price payable by using the following formula:

Total _Amount = Meal_Price + Sales_Tax

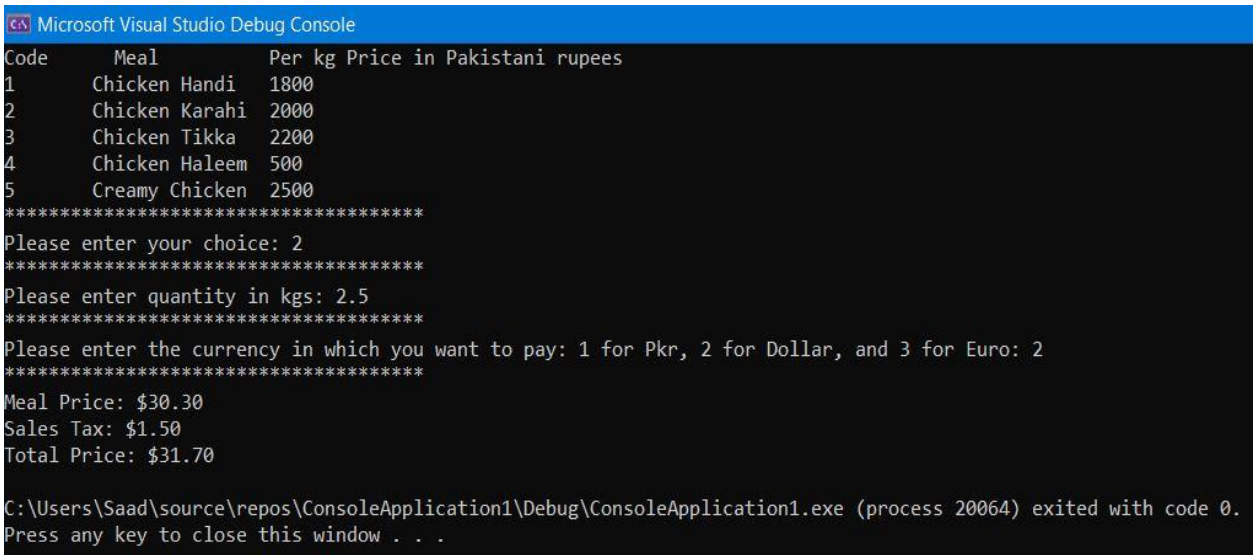
Hint: You can calculate everything in Pakistani rupees, and then convert them into the desired currency.

After calculating the total amount in rupees, you are required to convert the amount into the desired currency (based on the user's choice). For example, if the user selected rupees then simply display final price, i.e., (Total Amount = Meal_Price + Sales_Tax) in rupees but if the user selected dollar or euro, then simply convert the final meal price that you calculated earlier (in rupees) into dollar or euro according to the currency exchange rate. Also display the amount of sales tax and the meal price excluding sales tax.

Note:

Use current exchange rate for this assignment:

Sample Output:



TASK 3:

Write the algorithm of a program that calculates a car's gas mileage. The program should ask the user to enter the number of gallons of gas the car can hold, and the number of mile sit can be driven on a full tank. It should then display the number of miles that may be driven per gallon of gas.

A software company sells a package that retails for $99. Quantity discounts are given according to the following table.

Quantity	Discount
10---19	20%
20---49	30%
50---99	40%
100 or more	50%

Write the algorithm of a program that asks for the number of units sold and computes the total cost of the purchase.

Input Validation: Make sure the number of units is greater than 0.

TASK 4:

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:

Enter the first player's choice: 1

Enter the second player's choice: 1

This is Draw.

Sample Input & output:

Enter the first player's choice: 2

Enter the second player's choice: 3

Player 1 wins

TASK 5:

When we draw money from an ATM machine it asks us to specify the total amount that we wish to withdraw. The machine (actually the program running on a computer) then decides the number of currency notes of each denomination that (i.e. Rs. 500, Rs. 1000, Rs 5000) that must be given to the user in order to fulfil his request.

In this problem, you will write a program that will ask the user to enter the total amount the user wants to withdraw and then display the number of currency notes of each denomination that will be given to the user. Please remember that following rules must be followed while making the decision about the number of currency notes of each denomination.

Rule No 1. There must be enough money available in his/her account. Assume that the user also enters this value.

Rule No 2. The user must be given at least one note of Rs. 500.

Rule No 3. The machine must give a minimum number of currency notes to the user.

Rule No 4. Total amount specified by the user must be less than his maximum daily withdraw limit.

Assume that this daily limit will be provided/specified by the user.

Rule No 5. Total amount specified by the user must be a multiple of Rs. 500

TASK 6:

While filling a check for NBP (National Bank of Pakistan) a user need to write the amount to be withdrawn in English/Urdu. For example, to withdraw an amount of Rs. 100,000 the user must write One Hundred Thousands only and to withdraw an amount of Rs. 75 the user must write Seventy Five Only. This program will assist a relatively less illustrate person (i.e. a person who can write the Basic English alphabets) write the amount correctly. The user of this program will enter an amount in digits and the program will display the same amount written in correct format (i.e. amount followed by the word ONLY) using the English language. For the time being you can assume that the amount specified is always between Rs. 1 and Rs. 100. So your program should work correctly for all numbers between 1 and 100 inclusive.

TASK 7:

You have several pictures of different sizes that you would like to frame. A local picture-framing store offers two types of frames—regular and fancy. The frames are available in white and can be ordered in any color the customer desires. Suppose that each frame is 1 inch wide. The cost of coloring the frame is $0.10 per inch. The cost of a regular frame is $0.15 per inch, and the cost of a fancy frame is $0.25 per inch. The cost of putting a cardboard paper behind the picture is $0.02 per square inch, and the cost

of putting glass on top of the picture is $0.07 per square inch. The customer can also choose to put crowns on the corners, which costs $0.35 per crown. Write a program that prompts the user to input the following information and then output the cost of framing the picture:

a. The length and width, in inches, of the picture

b. The type of the frame

c. Customer's choice of color to color the frame

d. If the user wants to put the crowns, then the number of crowns

TASK 8:

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

Body fat formula for women:

A1 = (body weight × 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 × 1.082) + 94.42

A2 = wrist measurement × 4.15

B = A1 – A2

Body fat = body weight – B

Body fat percentage = body fat × 100 / body weight

Write a program to calculate the body fat of a person.

Good Luck ☺