



Tutorial Letter 103/0/2022

Introduction to Programming I

COS1511

Year 2022

School of Computing

This tutorial letter contains important information
about your module.

BARCODE

1 Assignment 1: 2022 SUBMISSION:**Electronically via *myUnisa***

Please note that we automatically give five days extension for this assignment. It will be to your own advantage to check after a few days whether the assignment has been registered on the system. If you have not completed the assignment by the extension date, submit whatever you have completed – you will get marks for everything that you have done.

If *myUnisa* is off-line when you want to submit the assignment, you need not contact us, because we will be aware of it. Simply submit it as soon as *myUnisa* is available again.

DUE DATE	20 April 2022
UNIQUE NUMBER	830138
EXTENSION	There is an automatic extension until 25 April . You do not need to phone or send an e-mail to request automatic extension
TUTORIAL MATTER	Study Guide, Lessons 1 – 16
CONTRIBUTION WEIGHT TO SEMESTER MARK	20%
QUESTIONS	Practical exercises

IS YOUR SOFTWARE INSTALLED?

Look at 'Troubleshooting' under 'Using the software' in file index.html on Disk2016.

If you struggle to install the software, please contact your e-tutor.

Question 1

Find a good cookbook. Read the instructions for your favourite dish. Write a program to display the recipe on the screen but with a difference. The quantity of each ingredient must be multiplied by a value entered from the keyboard.

For example, if the recipe needs 2 cups of flour the output displayed will be something like this

```
Please enter the factor to multiply the ingredients with : 4
Recipe name
Ingredients
    // other ingredients
    8 cups flour
Method
```

The program has the following structure:

- Declare an `int` variable named `mFactor` to store the value with which the quantity of each ingredient must be multiplied.
- The program must make use of a `cin` statement to input a value from the keyboard and store it in `mFactor`.

Submit both your program and output.

Question

A teacher at Leva Primary School needs to divide her class in different group sizes according to the activity they have to do. This will help her to prepare workstations for each group. For example, for art projects the class has to be divided in groups of 6; for science projects the class has to be divided in groups of 4. She asked you to write a program to determine the number of groups as well as the number of pupils who are left to form a smaller group. There are 56 pupils in the class.

The program has the following structure:

- Declare three `int` variables `nrPupils`, `nrGroups`, and `nrLeft`. `nrPupils` represents the number of pupils in a class, `nrGroups` represents the number of groups the class is divided into, and `nrLeft` represents the number of pupils, if any, who are in the remaining smaller group.
- Assign the value 56 to `nrPupils`.
- Declare an `int` variable `groupSize` that is used by a `cin` statement to input a value from the keyboard and store the size of the groups the teacher requested. Display an appropriate message. E.g. Please enter the size of each group?
- Write the statement to calculate the number of groups of size `groupSize`.
- Write the statement to calculate the number of pupils who are in the remaining smaller group.

The output of the program must be displayed as follows:

```
There are 9 groups consisting of 6
pupils There are 3 remaining pupils
```

Submit both your program and output

Question 3

You are requested to write a very simple calculator. Your calculator should be able to handle the five basic mathematic operations – add, subtract, multiply, divide and modulus – on two input values.

Your program should have the following structure:

- Ask the user to enter two `float` variables named `var1` and `var2`
- Ask the user to enter a character variable named `operation` to represent the operation to be performed on the two variables.
- Perform the appropriate operation by using `if`-statements
- The output must be given in fixed-point notation with two digits after the decimal point.

A typical run is displayed below:

```
Please enter the first float value:
35.6 Please enter the second value:
24.12 Please enter the operation
required : + The sum of 35.6 and
24.12 is 59.72
```

Submit both your program and

output. Question 4

The Computer Science Department follows certain criteria when a student learns to program. A number of programming exercises must be worked through. To proceed to the next exercise a student has to obtain a mark of 50% or more and must have completed 5 or more program runs. You are requested to write a program to validate if a student can proceed to the next program.

Your program should have the following structure:

- Declare two integer variables `programsDone` and `result`.
- Validate the data captured for the two variables using a `while` loop.
- The loop should be repeated until the value of `result` is greater than or equal to 50 **and** the value of `programsDone` is greater than or equal to 5.
- Display a message like "Good! You can now proceed to the next exercise"

Submit both your program and output.

Question 5

Include the `for` loop below in a small program and complete the program. The loop should execute 10 times. Do not change the `for` loop below. Compile and run your program to see for yourself that it works. You do not have to submit this program and output.

```
for (int i = 1; i <= n;
    i++) cout << i * i;
```

Now convert the `for` loop into a `while` loop and add any variable initialisations that you think are necessary. Compile and run your program and submit only the program containing the `while` loop and its output.

Question 6

A bookshop gives discount to customers as follows:

- Students get 10% discount,
- Book dealers get 12% discount and
- Pensioners get 15% discount.
- All other customers get 10% discount only if their total purchases are more than R200.

You are requested to write two versions of a program that calculates and displays the final amount that is due, after discount.

- (i) The first version of the program uses a `switch` statement to implement the above program.
- (ii) The second version of the program uses nested-`if` statements.

Hint:

Use the following variables:

```
float amount;           // the amount due before discount
char customerType;      // the type of customer: 'S' (student) or
                        // 'D' (dealer) or 'P' (pensioner) or
```

```

//      'O' (other)      float      discount,
finalAmount;

```

Submit both programs and their output.

Question 7

The following code is supposed to display the positive even numbers less than 12. That is, it will output the numbers 2, 4, 6, 8 and 10. However, there is a logical error in the code. Explain what the output of the code below will be. Then write a small program including the code below and make the necessary changes to fix the code so that it displays what it is intended to display. Ensure that your program works correctly. Only submit the program, not the output.

Hint: Use variable diagrams to trace the program to help you find the logical error.

```

int x = 1;
while (x
!= 12)
{

    cout << x <<
endl; x = x +
2;

}

```

Submit your program and output.

Question 8

The following incomplete program first asks the user to enter the number of items he/she has eaten today and then to enter the number of calories for each item. It then calculates the number of calories he/she has eaten for the day and displays the value.

```

#include
<iostream> using
namespace std;
int main()
{

    int numberOfItems;
    int count; //loop counter for the
    loop int caloriesForItem;
    int totalCalories;
    cout << "How many items did you eat
today? "; cin >> numberOfItems;
    cout << "Enter the number of calories in each of
the "
    << numberOfItems << " items eaten: " << endl;

    //
    Your code

```

```

        cout << "Total calories eaten today = " <<
        totalCalories; return 0;
    }

```

You have to complete the code. First complete the code by using a `while` loop to read in the calories of all the items. Compile and run your program and submit only the code that you added and the output. Then change your program to use a `for` loop to read in the calories of all the items. Compile and run the program again and submit only the code that you added and the output. Use the variables that have already been defined in the given program. Test your program by entering 7 for the number of items and the following values for the calories:

```
7 120 60 150 600 1200 300 200
```

If your logic is correct, the following will be displayed:

```
Total calories eaten today = 2631
```

Submit your program and

output.

Question 9

Suppose a new member of the city council has to be chosen from three candidates and suppose there are 4 voting stations. We need a C++ program that will count the votes for every candidate and display the result. At every voting station the voters vote by choosing A, B or C on a ballot paper. The voting officer must enter the votes into the program so that they can be counted. X is entered when all the votes at a specific voting station have been entered.

The program has the following structure:

- The three totals and the number of spoilt votes are initialised to 0. Use the following integer variables `votesForA`, `votesForB`, `votesForC`, `spoiltVotes`
- Use a `for` loop, going from 1 to the number of voting stations.
- Inside this loop is a `while` loop. A prompting message appears on the screen, asking the voter for which candidate he or she wants to vote. The choice of the voter is then input.
- Inside the `while` loop is a `switch` statement to increment the correct total. The `default` option is used to count the number of spoilt votes.
- The `while` loop is exited when X is entered for the choice.
- When the `for` loop is exited, the three totals and the number of spoilt votes are displayed.
- Display the results as follows:

```

Total candidate A:
xxx Total candidate
B:    xxx    Total
candidate C:   xxx
Total spoilt votes:
xxx

```

Run your program with the input given below and submit printouts of the program and output. (We write the data of each voting station in one line, but you will possibly enter the values on separate lines.)

B B B A C X
 A B C D Y B X B A C
 C B X
 A B X

Submit your program and output.

Question 10

Draw a series of variable diagrams for the program below using the conventions of the Study Guide. Assume that the following input is given: 2010 t

```

1  #include <iostream>
2  #include <string>
3  using namespace std;
4  int
main() 5
{
6      int year; char code;
7      bool book = true; float discount = 0.20;
8      cin >> year >> code;
9      switch (year)
10     {
11         case 2008: case 2009:
12             if (code == 'c')
13                 if (!book)
14                     discount += 0.20;
15             break;
16         case 2010:
17             if (book)
18                 if (code == 't')
19                     {
20                         book = false;
21                         code = 'g';
22                     }
23         case 2011:
24             if (discount > 0.20 || code == 'g')
25                 discount = 0.15;
26             else
27                 discount += 0.10;
28         default:
29             discount = 0.25;
30             code = 'b';
31             book =
true; 32     }
33     discount = 0.35;
34     cout << year << " " << code << " " << book << " "
        << discount << endl;
35     return 0;
36 }
```