Tutorial Letter 102/2/2018

Introduction to Programming I
COS1511

Semester 2

School of Computing

This tutorial letter contains Assignment 2 for Semester 2.

BARCODE

Define tomorrow.

UNISA | university of south africa

CONTENTS

1 INTRODUCTION

Dear student,

Hope you are well. This tutorial letter contains Assignment 2. Assignment 2 contributes 40% towards your semester mark and requires you to write and submit programming code.

2 ASSIGNMENT 2

Assignment 2 is a practical assignment and thus must be written and submitted.

- We urge you to do and submit this assignment; otherwise you will find it very difficult in the examination.
- For this assignment you have to write, compile and run programs using the software that you have installed.
- Students must submit this assignment via *myUnisa*.
- Assignment 2 must be submitted in **PDF format**. See Additional Resources on the COS1511 course website for instructions on how to create an assignment as a PDF file.
- Keep to the submission date for the assignment as stated in the study plan of this letter.
- We do not necessarily mark all questions. You will get 0% if you do not submit the questions that are marked.
- The semester system does not allow for late submission of assignments. **However, we give 3 days' automatic extension for Assignment 2**. This means that you may submit the assignment up to 3 days after the due date, without making special arrangements with the Assignments department. Although *myUnisa* will give you a message to say that your assignment is late, the assignment will still be accepted by the *myUnisa* system.
- The programs must be written in C++. You may not use any other high-level language for COS1511. Your programs must follow the programming style used in the Study Guide. In the assignments and the examination, marks are awarded for **programming comments, programming style, syntax and logic.**
- The input data as specified in the questions will be used to test your programs.
- No marks are allocated for programs that do not compile.

3 CALCULATION OF THE SEMESTER MARK

The marks that you obtain for Assignments 1, 2 and 3 form the semester mark for COS1511. The semester mark forms 20% of the final mark for the module. The weights of the COS1511 assignments are indicated in the table below:

Assignment number	Weight
1	30%
2	40%
3	30%

An example follows: Suppose a student gets 60% for Assignment 1, 45% for Assignment 2 and 65 for Assignment 3. In order to calculate the semester mark, the mark obtained for the specific assignment is multiplied by the weight. This then forms part of the 20% that the semester mark contributes to the final mark. Therefore:

Assignment	Marks obtained	Weight	Contribution to semester mark	
1	60%	30%	60/100 x 30/100 x 20	3.6
2	68%	40%	68/100 x 40/100 x 20	5.4
3	65%	30%	65/100 x 30/100 x 20	3.0
TOTAL				12.0

In this example the student has a semester mark of 12.0 out of 20. **The semester mark will not form part of the final mark of a supplementary examination.**

4 DUE DATES OF ASSIGNMENT

The table below gives the due dates of the assignments for this module.

Assignment	Due Date 2nd semester	Weight
1	27 August 2018	30%
2	21 September 2018	40%
3	05 October 2018	30%

5 SUBMISSION OF ASSIGNMENT 2

Submit assignment 2 (as a .pdf file) via *myUnisa.* No assignments in the wrong format can be accepted.

For detailed information and requirements as far as assignments are concerned, see *Studies@Unisa*, which you received with your study package. Follow the instructions given in Tutorial Letter COSALLF/301/4/2018, as well as the brochure *Studies@Unisa*, when submitting your assignments. The URL for *myUnisa* is: http://my.unisa.ac.za/. Instructions on how to register to become a *myUnisa* user, and how you should format your assignments before you submit them electronically, are given on the website. The two most important things to remember are that your submission must consist of a single text file, and that you may submit an assignment only once.

To submit an assignment through *myUnisa*:

- go to *myUnisa*
- log in with your student number and password
- select the module
- click on assignments in the menu on the left-hand side of the screen
- click on the assignment number that you wish to submit
- follow the instructions

PLEASE NOTE: Assignments can be tracked (e.g. whether or not the University has received your assignment or the date on which an assignment was returned to you) on *myUnisa*.

6   ASSIGNMENT 2: 2ⁿᵈ SEMESTER

SUBMISSION: **Electronically via *myUnisa***

Please note that we automatically give three 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	21 September 2018
UNIQUE NUMBER	872356
EXTENSION	There is an automatic extension until **24 September 2018**. You do not need to phone or send an e-mail to request automatic extension
TUTORIAL MATTER	Study Guide, Lessons 17 – 23
CONTRIBUTION WEIGHT TO SEMESTER MARK	40%
QUESTIONS	Practical exercises

NOTE: Students are encouraged to use variables for all values as well as calculations. Refrain from performing calculations within `cout` output statements. Marks will be allocated for the correct use of variables.

Remember that Assignment 2 should be submitted as a pdf document.

ASSIGNMENT 2   **Total (60)**

QUESTION 1:	(20)

BMI or **Body Mass Index** is a method of estimating a person's **body fat** levels based on a person's weight and height measurement. The BMI is calculated by dividing the person's body mass/weight (in kilograms) by the square of the body height (in metres). The result is universally expressed in units of kg/m2.

BMI formula: BMI = weight /(height)^2

BMI	Weight status
Below 18.5	Underweight
18.5-24.9	Healthy
25.0-29.9	Overweight
30.0 and above	Obese

Write a program that calculates a person's **BMI** and displays the weight status according to the BMI value, indicating whether the person is underweight, healthy, overweight or obese. The BMI weight statuses and related values are listed in the above table.

The program should have the following functions:
    1.1. `getData` that prompts and returns their weight and height;   **(5)**
    1.2. `calcBMI` to calculate the BMI ;   **(5)**
    1.3. `displayFitnessResults` to display the BMI and relevant weight status message; **(5)**
    1.4. `main` function   **(5)**

submit   **You have to submit the program code and output.**

QUESTION 2:	(40)

Suppose we want to compile a student academic report for a high school learner in grade 12 (matric). A matric learner is enrolled for 6 study units (subjects), namely: **English, Mathematics, Life Orientation, History, Computer literacy, Geography.** The learner has to pass at least four subjects, including English, to complete grade 12. The subject pass mark is **50%.**

Write a program that prompts the learner to key in their marks for each subject. The program should include the following functions:

a. A function `studentDetails`, that prompts the learner to key in their personal details `name`,`surname`, and `schoolName`.   **(3)**

b. A function `getMarks` , that prompts the learner to key in a mark for each of the six subjects, and validate the marks. Do not accept marks lower than 0 or higher than 100.   **(3)**

c. A function `calcAverageYearMark` , to **calculate and display** the **average** of the 6 Subjects. This function should be called just once by main, and should be passed the 6 Subject marks.   **(6)**

d. A function `minMax`, to find and return the lowest and the highest of the 6 subject marks passed to it as the subject with the lowest mark;   **(6)**

6

e. A function `passOrFail`, to determine whether the student has passed or failed grade 12. **(9)**

f. A function `awardDistinction` to determine which of the subjects have received distinctions. A **subject** receives a distinction if the mark is 75% and above.   Also a student has **passed with distinction** if the average mark is 75% and above. **(3)**

g. A function `codeSymbol`, to convert each mark to a symbol (A, B, C, D, E, F) and a code (7,6,5,4,3,2,1). The symbol and code should be printed next to the mark in the student report. The same should be calculated and displayed for the average mark. **(6)**

h. A function to Display the student report. **(4)**

Use the table below to determine the student symbol and code attained.

CODE	SYMBOL	MARK
7	A	80 - 100%
6	B	70 - 79%
5	C	60 - 69%
4	D	50 - 59%
3	E	40 - 49%
2	F	30 - 39%
1	FF	0 - 29%

Execute your program using the following data:

	John Africa (Kings College)	Mary Smith (Green valley High)	Thuli Booi (Gauteng girls)
English	50%	48%	82%
Mathematics	76%	80%	66%
Life Orientation	40%	75%	62%
History	62%	70%	76%
Computer literacy	56%	86%	86%
Art	38%	72%	78%

submit   **You have to submit the program code and output.**

Sample run:

```
Please key in your name:
John Africa
Please key in the name of your school:
Kings College
Key in your mark for English:
50
Key in your mark for Mathematics:
76
Key in your mark for Life Orientation:
40
Key in your mark for History:
62
Key in your mark for Computer literacy:
56
Key in your mark for Art:
38


**********************************************
              **** STUDENT ACADEMIC RECORD
This program inputs the learner marks of matric level
subjects and prints the student final report.

**********************************************
****

Name: John Africa      School: Kings College

Subject               Mark        Symbol      Code
English               50%         D           4
Mathematics           76%         B           6
Life Orientation      40%         E           3
History               62%         C           5
Computer literacy     56%         D           4
Art                   38%         F           2

Average Year Mark: 53.67 with Symbol D and code 4
Outcome: Passed

The highest mark was 76%
The lowest mark was 38%
**********************************************
```

QUESTION 3: **(10)**

Draw variable diagrams for the following program with input values 2 (for variable `first`) and 3 (for variable `second`).

Note : Refer to Lesson 23 of the Study Guide and go through the activities to figure out how the execution flows in a program like this where the `main()` calls other functions. Follow the conventions specified in the Study Guide when you draw the variable diagrams.

For instance:
- A ? shows an uninitialized value for a variable.
- The notation 25 → 5 means that execution jumps from line 25 to line 5.
- We use square brackets [ ] around the name of a variable to show that it is inaccessible while the current function is being executed.

```
1   #include <iostream>
2   using  namespace std;
3
4   void  multiplyBy2(int  firstP,  int secondP)
5   {
6       firstP = firstP * 2;
7       secondP = secondP * 2;
8   }
9
10  void  multiplyBy3(int & firstP,  int & secondP)
11  {
12
13      firstP = firstP * 3;
14      secondP = secondP * 3;
15  }
16
17  int main()
18  {
19      int first, second;
20      cout << "Enter the first number: "<< endl;
21      cin >> first;
22      cout << "Enter the second number:" << endl;
23      cin >> second;
24      multiplyBy2(first, second);
25      multiplyBy3(first, second);
26      cout << "The first number is "<< first << " now." << endl;
27      cout << "The second number is " << second << " now." << endl;
28
29      return 0;
30  }
```