TEST 1 - CSC213: COMPUTER PROGRAMMING II

Date: 25 November 2024

Time Allowed: 1 hour 50 minutes

Total Marks : 100

PROBLEM

The basal metabolic rate (BMR) is the amount of energy needed while resting in a temperate environment when the digestive system is inactive. It is the equivalent of figuring out how much gas an idle car consumes while parked. In such a state, energy will be used only to maintain vital organs, which include the heart, brain, kidneys, nervous system, intestines, liver, lungs, sex organs, muscles, and skin. For most people, upwards of 70% of total energy (calories) burned each day is due to upkeep. Physical activity makes up 20% of expenditure and 10% is used for the digestion of food, also known as thermogenesis

YOUR TASK

Information about physical measurements of student's height, weight and exercise activity levels in a class are stored in a text file. Each record in the file has the student's name (one word/string), initials (one word/string), gender (one word/string), student identity number (string), weight (in KG), height (in centimeters), age (in years) and activity level (an integer value between 1 and 5). Your task is to design and implement a C++ program that extracts information from the student information dataset and generates a report. For each student, the report shows the student's details, and the computed BMR and CALORIE intake needs.

THE DATASET

The data is stored in a single text file (i.e. data.txt). The figure below shows a sample of the file.

data.txt

SURNAME	INITIALS	GENDER	SID	WEIGHT	HEIGHT	AGE	LEVEL
DLAMINI	L.A.	MALE	120786	65	170	25	2
SHONGWE	T.M.	FEMALE	120785	70	173	18	1
BENNET	T.S.	FEMALE	120783	60	137	20	4
THWALA	D.M.	MALE	120251	70	204	22	1
BEATRIC	S.P.	FEMALE	120786	65	159	21	5
DVUBA	M.	MALE	120197	70	175	28	3
SIBISI	J.N.	MALE	120630	80	180	23	2
VILAKATI	K.	FEMALE	120246	79	171	21	4
SISA	D.M.	MALE	120240	64	194	30	3

QUESTION 1

(a) [**10 Marks**] Write a function that computes the basal metabolic rate (BMR) given gender, weight, height and age as parameters/arguments. The computation is achieved as shown below:

For male students:

BMR = 66 + (13.7 x Weight in KGs) + (5 x Height in CMs) – (6.8 x age in YEARS)

For female students:

BMR = 65 + (9.6 x Weight in KGs) + 1.8 x Height in CMs) – (4.7 x age in YEARS)

(b) [**10 Marks**] Write a function to compute the daily calorie needs given the **BMR** and **activity level** as parameters/arguments. Daily calories needed may be computed by multiplying the **calorie factor** by the **BMR**. The **calorie factor** is determined by the activity level as shown in the table below:

Activity	Level	Factor
Insignificant	1	1.2
Light	2	1.375
Moderate	3	1.55
Active	4	1.725
Exceptional	5	1.9

QUESTION 2– 30 marks

Write pseudocode for a function that extracts information from the given student information data text file and displays (on standard output) a report in the following format.

```
                    UNIVERSITY OF SWAZILAND
          BMR/ CALORIE NEEDS FOR CSC213 CLASS, NOVEMBER, 2024
                    PRODUCED BY : <your name and id>
================================================================
ID   NAME        GENDER     WEIGHT   HEIGHT  AGE BMR     CALORIES
================================================================
---- ---------   -----      ---       ---    --  -----    -----.-
---- ---------   -----      ---      ---     --  -----    -----.-
---- ---------   -----      ---      ---     --  -----    -----.-
================================================================
SUMMARY
========
TOTAL NUMBER OF STUDENTS                          = ---
AVERAGE BMR FOR ALL STUDENTS                      = ---.--
AVERAGE CALORIE INTAKE FOR ALL STUDENTS           = ---.--
```

NOTES:

1. NAME starts with INITIALS followed by SURNAME
2. The BMR value is computed using the function in Question 1(a).
3. The CALORIES value is computed using the function in Question 1 (b).
4. The NUMBER OF STUDENTS refers to the number of student records extracted
5. AVERAGE BMR refers to TOTAL BMR FOR ALL STUDENTS / NUMBER OF STUDENTS
6. AVERAGE CALORIE refers to TOTAL CALORIE NEEDS FOR ALL STUDENTS / NUMBER OF STUDENTS

QUESTION 3 - 45 Marks

Translate your pseudocode (from Question 2) to an actual C++ function. The recommended function name is **generateStudentBMRreport**. The function is expected to take one parameter/argument: *the name of the data file*.

Note: You may consider using additional functions to display the header text and separator line characters (i.e. the equal (=) characters).

QUESTION 4 - 5 Marks

Write a C++ main function that calls the **generateStudentBMRreport** function defined in Question 3 above.

----------END ----------