

CIT 133 Beginning C++
Assignment #5 – Total Points = 100

Assigned Date: 10/1

Date Due: 10/11

DO NOT share your answers with anyone. DO NOT collaborate on completing work with anyone. DO NOT use the Internet to search for solution to assignments. DO NOT pay anyone to write your code. Failure to meet this requirement leads to a violation of the academic integrity principles.

Grading Criteria File: See the grading criteria file under Modules/resources and Files.

Objective: Demonstrate your understanding of C++ decision structure. This assignment is based on the material covered in **chapter 4** of your textbook.

Assignment: Write a C++ program for calculating body fat. The program will ask for the person's full name (can have spaces), gender (male or female), and the information needed for the given gender to calculate body fat.

Process: Use the following formulas to calculate body fat.

Body fat formula for women:

$$\begin{aligned} A1 &= (\text{weight} * .732) + 8.987 \\ A2 &= \text{wrist measurement} / 3.14 \\ A3 &= \text{waist measurement} * .157 \\ A4 &= \text{hip measurement} * .249 \\ A5 &= \text{forearm measurement} * .434 \\ B &= A1 + A2 - A3 - A4 + A5 \\ \text{Body fat} &= \text{weight} - B \\ \text{Body fat percentage} &= \text{Body fat} * 100 / \text{weight} \end{aligned}$$

Body fat formula for men:

$$\begin{aligned} A1 &= (\text{weight} * 1.082) + 94.42 \\ A2 &= \text{waist measurement} * 4.15 \\ B &= A1 - A2 \\ \text{Body fat} &= \text{weight} - B \\ \text{Body fat percentage} &= \text{Body fat} * 100 / \text{weight} \end{aligned}$$

Additional criteria:

- Display all of the input values along with the values of A1, A2, etc.
- If a gender other than male or female is entered, issue an error message and do not calculate/display any data.
- If the input weight is a negative number or is higher than 300, issue an error

- message and do not calculate/display any data.
- All output values except the body fat percentage will be displayed with 2 digits after the decimal point.
 - The body fat percentage should be displayed without any digits after the decimal point.
 - Ask the user if he/she wishes to write the data to a file. If so, write **ONLY** the name of the person and his/her body fat percentage to an output file whose name is entered by the user. Name will appear on line 1 and body fat percentage will appear on line 2.

Use the file format: **firstNameLastNamecit133_hw5.cpp** for your source file name. Submit your file to the assignment dropbox in Canvas. **DO NOT** submit your output **businesscard.txt** file. The following is a sample run of the code. Make sure to fully test your program. The given sample run is not a full test of your program. **Your processing must be VERY similar to the sample run.**

SAMPLE RUN:

Enter your name: Foo Bar
Enter your gender (male or female): unknown
Invalid gender – program terminates
Enter your name: Foo Bar
Enter your gender (male or female): male
Enter your weight: -1
Invalid value for weight - program terminates
Enter your name: Foo Bar
Enter your gender (male or female): male
Enter your weight: 150
Enter your waist measurement: 32

***** BODY FAT DATA *****

Name: Foo Bar
A1 = 256.72
A2 = 132.80
B = 123.92
Body Fat = 26.08
Body fat percentage = 17%

Enter 1 to Write data to a file: 1
Please inspect the file “foo bar.txt”. The contents of the file will be:
Foo Bar
17

Enter your gender (male or female): female
Enter your weight: 120
Enter your wrist measurement: 6

Enter your waist measurement: 28
Enter your hip measurement: 28
Enter your forearm measurement: 15

***** BODY FAT DATA *****

Name: Foo Bar

A1 = 96.83

A2 = 1.91

A3 = 4.08

A4 = 6.97

A5 = 6.51

B = 94.19

Body Fat = 25.81

Body fat percentage = 22%

Enter 1 to Write data to a file: 0

A file will not be created