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| **Instructor** |  | **Due Date** |  |

**PROJECT Selection Program Control : BMI Calculator 50 points**

**Objective** To write a program that will generate a person’s BMI result based on the persons weight and height.

***PROJECT DESCRIPTION***

Write a program that calculates and displays a persons’ body mass index ( BMI ) .   
 The BMI is often used to determine whether a person is overweight or underweight for his or her height. A person’s BMI is calculated with the following formula:

BMI = [ weight × 703 / height 2 ]

where *weight* is measured in pounds and *height* is measured in inches. The program should ask the user to enter his or her weight and height and then display the user’s BMI value.

The program should also display a message indicating whether the person has optimal weight, is underweight or is overweight. A person’s weight is considered to be optimal if their BMI is between 18.5 and 25 . If the BMI is less than 18.5 the person is considered underweight. If the BMI value is greater than 25 , the person is considered to be overweight.

When completed, copy your program source code as well as include a snapshot of your running program input / output results along with your name and course number, etc. into an MS Word doc. Submit your file to the appropriate to Blackboard when complete.

***Information about This Project***

**[ Selection Program Control ]**

The three types of program control include sequential, selection and repetition. Selection program control arises when the execution of the programming statements occurs in a step by step fashion but with decisions or branches appearing along the way.

**[ Body Mass Index ]**

An example of computing a BMI value is:

*body weight* 210 pounds

*height* 72 inches

BMI = [ weight × 703 / height 2 ]

BMI = [ 210 × 703 / 72 ] 2

BMI ≈ 28.5 *overweight*

You can check your result by visiting an online BMI calculator such as the one located at this link:

[**https://www.bcbst.com/providers/MPMTools/BMICalculator.shtm**](https://www.bcbst.com/providers/MPMTools/BMICalculator.shtm)

Programming a BMI application can be simplified using **if** statements.

Here are some examples of using various forms of **if** statements.

**[ Selection Control Examples: One - Way if Statement ]**

**# example: one - way if statement**

**num1 = 1**

**if (num1 > 0) :**

**print ("the given number exceeds zero")**

**[ Selection Control Examples: Two - Way if Statement ]**

**# example: two - way if statement**

**num2 = 22**

**if (num2 >= 10 and num2 <= 20) :**

**print ("the number is between 10 and 20, inclusive")**

**else :**

**print ("the number is NOT inclusively between 10 and 20")**

**[ Selection Control Examples: if - elif - else Statement ]**

**a = 5 ; b = 10 ; c = 20**

**if (a == 5 and b == 20) :**

**print ("perform task 1")**

**elif (a == 5 or b == 20) :**

**print ("perform task 2")**

**else :**

**print ("perform task 3")**

***Steps to Complete This Project***

**STEP 1**  **Open the Python IDLE IDE and Write the Program Code**

Open the Python IDLE IDE ( Integrated Development Environment ) or similar Python development environment on your computer.

**[ MS Visual Studio ]**

Open Microsoft Visual Studio, click [ Create a new project ] and at the next window, highlight the [ Python Application ] template and and click on Next.

In the **Configure your new Project** dialog box, add in a desired Project name like Lab2 and check where is says ‘Place solution and project in the same directory’. Press Create to finish and proceed to the newly created Python source file, where you will write your program code.

**[ Python IDLE ]**

You will notice when you initially open Python, the default is an interpretive shell allowing only for single commands to be given. You really need to enter in a whole program then execute it to work any of the labs for the course. To start entering code into IDLE go to **File > New File** from your menu. This will allow you to enter your source code in an editor style format like Notepad.

**STEP 2**  **Consider the Pseudo - Code for this Application**

Prior to writing the code statements for this project, you can examine the   
pseudo - code that can be used to compute the desired results.

**Prompt the User for the Person’s Weight ( in pounds U.S. )**

**Input the Person’s Weight**

**Prompt the User for the Person’s Height ( in inches U.S. )**

**Input the Person’s Weight**

**Compute and display the BMI**

**If the BMI is Below 18.5 Then**

**Print the Person is Underweight**

**Else If the BMI is Between 18.5 and 25 Then**

**Print the Person is Normal**

**Else**

**Print the Person is Overweight**

**End If**

**STEP 3**  **Write the Program Code for this Application**

Complete the program statements to satisfy the requirements of this application.

**STEP 4**  **Run and Test Your Program**

With your application compiling correctly and without any errors, run your program.

**[ MS Visual Studio ]**

To run your program, use [ Ctrl ] + [ F5 ] .

**[ Python IDLE ]**

To run your program, go to your menu and choose **Run > Run Module** or press [ F5 ] on your keyboard to run your program.

Test your program with various weights and heights such that each of these

scenarios are resulted.

*person is underweight*

*person is normal*

*person is overweight*

Take a screen snapshot for each of the above scenarios and submit the snapshots for credit in an MS Word or equivalent document. Place your program source code into the same MS Word document and submit the document for credit into Blackboard in the appropriate area. Also please include your .py file as well.

**[ BMI Sample Output ]**

A screenshot of a cell phone

Description automatically generated

\*Grads supplement your code that incorporates a menu that will allow the user to choose an option to enter the weight and height in either customary English units or metric units.

Display results showing each outcome, i.e., one in English units and one in metric units i.e., a BMI computed from English units and a BMI computed in metric units.

**STEP 5 Questions and Answers Concerning this Computer Laboratory Project**

Answer the following questions in your own words.

Open MS Word and, within a new document, place your responses to each of these questions. Submit your completed MS Word document for credit.

**(1)** What is meant by variable declaration and initialization?

Variable declaration: We use variables to tell if the data is string,integer,list etc.To manipulate this data,we do through variables.

Initialization:First,we initialize a variable by creating container and assign it a name.Secondly,we assign value to that variable which is assignment.

**(2)** Explain how selection control is used in your program code for this application.

We use If condition to check the choice entered by user as input.Based on the choice,the program will compute the BMI value.Now,again using if condition the value of BMI is checked to identify if the person is obese/normal,overweight,underweight.

**(3)** This program application made use of an **if - elif - else** statement block. Could you also have coded this application with just a sequence of one - way **if** statements? Explain your answer.

We can code this application with one-way if statement,but the conditions to check BMI value for obese,normal,overweight,underweight cannot be specified explicitly.So,proper functioning of this application,we need to go with if-elif-else statement.

**(4)** Which kinds of datatypes were used for the variables in your application?

**To get the choice from the user,we used integer datatype.To get the height,weight from the user,we used float variables.**

**(5)** What have you learned from performing and coding for this lab assignment?

The multi-way If statement is the most efficient of all since one or more alternative conditions can be given.This is made possible using ‘elif’(a combination of else and if).In our application,the bmi value is checked first if it is >=18.5 and <=24.9.If the value does not fall in this range,it checks if it is less than 18.5,even if this condition failes,it checks the next condition in sequence which is if bmi between 25.0 and 29.9.And if none of the conditions meet,then else part is executed.