**HW01 Java Programming Fundamentals**

Due Date: **See Canvas**

Purpose: Learn to use Eclipse to develop a Java program.

Apply fundamental programming concepts to obtain input from the user, declare variables of different types, manipulate those variables with math operations and display results.

Effort: **Individual**: Read [CS Academic Integrity .pdf](https://drive.google.com/file/d/1vHXGQPPRUXZQrUxfnM6hJQid9jio7xlt/view?usp=sharing)

Points: **80 (see rubric in canvas)**

Deliverables: **Upload this document with your answers and your .java file as separate files. Do not upload as a zip file.**

**Description**

You will create a program to do the following calculations. You can choose to implement for a male or female.

A calculator is needed to estimate body fat and body mass index based on

* U.S. Army formula (either male or female).
* BMI formula

The user will enter the measurements for the calculation

* height in inches
* neck in inches
* waist in inches
* hip in inches (only for female calculation)
* weight in pounds

Display the results and the tables for

* Maximum Allowable Body Fat Percentage to Join Army
* BMI weight status

Resources:

* [Army Body Fat Calculator - % of body fat based on the US Army formula](https://www.gigacalculator.com/calculators/army-body-fat-calculator.php)
* [Adult BMI Calculator](https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html)  and [Adult BMI Table](https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html)

**Sample Output for Female Calculation**

| \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  This program will calculate body fat for a female  using the Army formula and the BMI formula.  -------------------------------------------------  Enter height in inches: 67  Enter neck in inches: 10.5  Enter waist in inches: 30  Enter hip in inches: 38.25  Enter weight in pounds: 125  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Your Army body fat is 30.728801266589784  Maximum Body Fat to Join Army  Age Female  -------------------------------------------------  17-20 30%  21-27 32%  28-39 34%  40 and over 36%  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Your BMI is 19.575629316106035  Recommended Body Weight  BMI Weight Status  -------------------------------------------------  Below 18.5 Underweight  18.5 - below 25 Healthy Weight  25.0 - below 30 Overweight  Over 30 Obese |
| --- |

**Problem Solving**

**Review the description above and the specification below. Before you write any code, answer the following.**

1. What are the main tasks that your program needs to do?

| My program will need to take user inputs of height, neck, waist and weight, and calculate BMI and body fat percentagem and print back to the user. |
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2. What java concepts do you think you will use?

| I will use printing, different data types and math functions. |
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3. List at least 4 resources that will help with the assignment.

| Concept | Resource Location - can be any of the following   * Lecture Number and slide * Section from the book * Resource from [Javatpoint](https://www.javatpoint.com) |
| --- | --- |
| Java Log function | from programiz.com |
| Scanner classes | from Javatpoint |
| Data types | L03 Ch02 Primitive Data Types slide 10 |
| Type casting | L03 Ch02 Primitive Data Types slide 12 |

4. The program needs to perform calculations using math functions. Review [Java Math class with Methods - Javatpoint](https://www.javatpoint.com/java-math). List variable identifiers you will use to hold the information entered and then write the formulas in java below using the functions from the math class.

| **For example, constant** for the constant value in the BMI formula – set to 703  Variables: heightIn, neckIn, waistIn, weightIn, userHeight, userNeck, userWaist, userWeight, armyBfRaw, armyBf, userBMIraw, userBMI  Army Formula **double** armyBfRaw;    armyBfRaw = 86.01 \* java.lang.Math.*log10*(userWaist - userNeck) - 70.041 \* java.lang.Math.*log10*(userHeight) + 36.76;    **long** armyBf;    armyBf = Math.*round*(armyBfRaw);  BMI Formula  **double** userBMIraw;  userBMIraw = 0;    userBMIraw = (userWeight / (userHeight \* userHeight)) \* 703;    **long** userBMI;    userBMI = Math.*round*(userBMIraw); |
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5. It is important to make sure your program works. List the inputs and outputs of 3 different data sets for each formula you will use to test that your program works.

**Task: Calculator U.S. Army Body Fat Formula (Female) - You can choose male instead.**

| **Input** | **Output** |
| --- | --- |
| Here is an example  height in inches: 67  neck in inches: 10.5  waist in inches: 30  Enter weight in pounds: 125 | 31% |
| Enter height in inches:  66  Enter neck in inches:  10  Enter waist in inches:  30  Enter weight in lbs:  120 | 21% |
| Enter height in inches:  78  Enter neck in inches:  16  Enter waist in inches:  32  Enter weight in lbs:  170 | 8% |
| Enter height in inches:  69  Enter neck in inches:  16  Enter waist in inches:  28  Enter weight in lbs:  135 | 1% |

**Task: Calculate BMI**

| **Input** | **Output** |
| --- | --- |
| Here is an example  height in inches: 67  Enter weight in pounds: 125 | 19.6 |
| Enter height in inches:  66  Enter weight in lbs:  120 | 19 |
| Enter height in inches:  78  Enter weight in lbs:  170 | 20 |
| Enter height in inches:  69  Enter weight in lbs:  135 | 20 |

6. Read [coding mindset](https://mitcommlab.mit.edu/broad/commkit/coding-mindset/) and [Java Naming Conventions - Javatpoint](https://www.javatpoint.com/java-naming-conventions). Why is a coding mindset important? How will you write code that is easy to understand?

| A coding mindset is important to ensure you are making code that does its intended purpose, is easy to understand and can be built upon. I will write code that is easy to understand by segmenting code and using comments to explain what is going on. |
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**Implementation and Specification**

Implement as specified below and with a coding mindset.

1. Create Java Project called **CS1150HW**
   * File -> New -> Java Project
   * This project is created once and is where all your homework assignments will be stored.

Now you can have two projects - one to explore code as you learn and one for your HW.



1. Create, Compile and Run a Java Class (File->New->Class) within that project called **LastNameFirstNameHW01**
   * For example, I would name my java class HardingDebHW01
   * Please use this naming convention on all assignments.
2. Always include an initial comment at the top of the java file:
   * Your name
   * Class name
   * Section (M/W) or (T/R)
   * Due date
   * Assignment #
   * Short description of what the assignment is about

**This initial comment is required on all assignments**.

This initial comment should be the **first lines** in your java file, before any code.

One way to create a multiple line comment in Java is with using **/\*** to start the comment and **\*/** to end the comment as shown below:

| /\*  \* Name: [YOUR NAME]  \* Class: CS1150 (M/W)  \* Due: [FILL IN]  \* Description: HW01 [FILL IN DESCRIPTION BELOW]  \* This program will  \*/ |
| --- |

1. Read in the user input and store in variables
   * height in inches
   * neck in inches
   * waist in inches
   * hip in inches (only for female calculation)
   * weight in pounds
2. Calculate the body fat using the variables above and store in variables for each
   * U.S. Army formula (either a male or female).
   * BMI formula
3. Display the results and the tables for
   * Maximum Allowable Body Fat Percentage to Join Army
   * BMI weight status

**Learnings and Reflection**

1. Explain each line of code below using these terms: package, class, object, method, variable, data type, assign, memory, declare, intialize

| The first line creates a scanner class. The second line creates the variable input, and makes it equal whatever the user inputs. The third line uses the method System.out.print to print enter height in inches, and the last line Double is a data type, which declares how much memory will be needed for the following variable. height is a variable. The last line makes the user able to input data. |
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2. How did your first homework assignment go for you? Did you run into any issues? What questions do you still have?

| The first homework went well. The only issue I had was my laptop no longer being able to charge and having to move all of my files elsewhere. |
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