



Computer Science 3B

Practical Assignment 03

Assignment date:

2024-08-08

Deadline

2024-08-08 17h05

Marks: 80

This practical assignment must be uploaded to eve.uj.ac.za **before** 2024-08-08 17h05. Late¹ or incorrect submissions **will not be accepted**, and will therefore not be marked. You are **not allowed to collaborate** with any other student. Plagiarism is not tolerated. All submissions are tested for plagiarism.

Good coding practices include a proper coding convention and a good use of commenting. Marks will be deducted if these are not present.

The reminder page includes details for submission. Please ensure that **ALL** submissions follow the guidelines. The reminder page can be found on the last page of this assignment.

BeatWatch is happy with the progress made thus far and have decided to integrate more data processing into the system. Workout intensity is an important metric to track when looking at fitness. Based on a person's age, the maximum heart rate of an individual is calculated by taking the heart rate and dividing it by $220 - \text{age}$. **BeatWatch** wants to apply this formula to a range of 8 heart rate readings over the course of a workout.

Write an 80x86 assembly program that will perform the following calculation:

$$\vec{O} = (\vec{I} / (220 - \text{age}))$$

where

\vec{I} - Array of heart rate values (input)

age - Age of person using tracker (input)

\vec{O} - Array of heart rate percentages (output)

Display a final intensity (output) message based on the average of \vec{O} shown as **A** below:

"none"	A < 60%
"light"	60% <= A <= 69%
"moderate"	70% <= A <= 79%
"vigorous"	A >= 80%

The division must be treated in a component wise manner. No rounding should be applied. Any percentages over 100% must be capped to 100%.

¹Alternate arrangements for exceptional circumstances will be posted on eve.

The program must ask the user for the **age** and the array of heart rate values. The program's final display (in a user friendly manner!) is as follows:

- Show the input array of heart rate values that the user provided
- Show the output array of heart rate percentages that are calculated
- Show the final intensity message based on the average of the array of heart rate percentages.

Your program must continually ask the user if they want to process another set of workout data. You are only allowed to create global variables for **age** and the input array (as well as any string prompts).

Testing set - Use these values to test your program:

Age	Input Array	Output Array	AVG	Intensity
20	[143, 59,180,247,222, 71,140, 97]	[71, 29, 90,100,100, 35, 70, 48]	67	Light
29	[150,153, 78,186,130,178,172,221]	[78, 80, 40, 97, 68, 93, 90,100]	80	Vigorous
43	[156,112, 61,214, 82,104,151,191]	[88, 63, 34,100, 46, 58, 85,100]	71	Moderate
47	[173, 69,106,101, 86,130, 70, 61]	[100, 39, 61, 58, 49, 75, 40, 35]	57	None
59	[176, 67,116, 71,164,163, 87,122]	[100, 41, 72, 44,100,100, 54, 75]	73	Moderate

Mark sheet

1. Design	[05]
2. Exit loop	[05]
3. Inputs from user	[05]
4. Modify array	[10]
5. Display intensity message	[05]
6. Display array	[05]
7. Structure and layout (no temporary variables, correct data types)	[05]
8. Commenting	[05]
9. Correct execution	[35]
Total	[80]

NB

Submissions that **do not assemble** will be capped at 40%!

Practical marks are awarded subject to the student's ability to explain the concepts and decisions made in preparing the practical assignment solution.

(Inability to explain code → inability to be given marks.)

Execution marks are awarded for a correctly functioning application and not for related code.

Reminder

Your submission must follow the naming convention below:

SURNAME_INITIALS_STUDENTNUMBER_SUBJECTCODE_YEAR_PRACTICALNUMBER

Example: Berners-Lee_TJ_209912345_CSC03B3_2024_P03

Surname	Berners-Lee	Module Code	CSC03B3
Initials	TJ	Current Year	2024
Student number	209912345	Practical number	P03

Your submission must be a single zip (compressed) file!

Your submission must include the following:

File	Naming	Folder	Purpose
Design	STUDENTNUMBER_P03.pdf	docs	Contains your program design. All files must be in PDF format. Your details must be included at the top of any PDF files submitted ⁰ .
Source	STUDENTNUMBER_P03.asm	src	Contains all relevant source code. Your details must be included at the top of the source code ⁰ .

Multiple uploads

Note that only one submission is marked. If you already have submitted once and want to upload a newer version then submit a newer file with the same name as the uploaded file in order to overwrite it.

⁰Failure to correctly indicate your details will result in a penalty.