

University of Tehran



College of Engineering



School of Electrical and Computer  
Engineering (ECE)

School of Mechanical Engineering  
(ME)

## **Mechatronics & Robotics**

### **Homework 0:**

Coding Warm-up

**Teaching Assistant:**

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**Deadline: 25 February 2024 (6 Esfand 1402), 23:59**

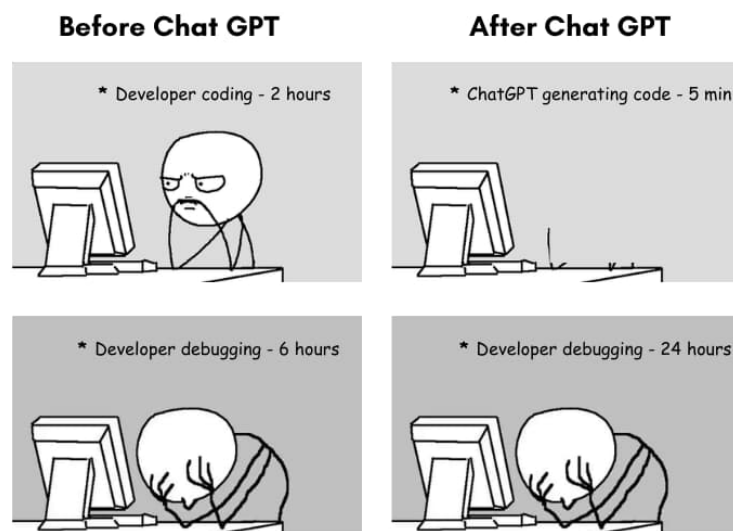
**This homework is voluntary and includes a 0.2 bonus points.  
There is no grace period for submission.**

## Homework Description

Hello and welcome to the course "*Mechatronics and Robotics*"! We're thrilled to have you join us for this exciting journey. This homework is all about getting warmed up for coding in Python and C++, as it will be a key asset for the rest of the course. So, let's put our "coding boots" on!

This homework aims to review some simple and key concepts of programming. As you work through the assignments, please consider the following remarks:

1. Complete all exercises in **both Python and C++**.
2. You are absolutely allowed (and it's even recommended!) to use AI tools like ChatGPT to assist you with your learning, but remember that mindless copying defeats the purpose. Interact actively, ask questions, understand the code, and explain it briefly in your reports. You are responsible for the content you submit, so remember that **you should not blindly accept the written code from AI, even if it produces some outputs without error!**
3. You can use online compilers such as:
  - [Google Colab](#) for Python
  - [OneCompiler](#) for C++ (**Note:** Online C++ compilers may not provide the same convenience as Google Colab. Consider running your C++ code on your local machine, particularly when it comes to plotting.)
4. If you need a quick refresher, you can use the following YouTube videos:
  - [Python for Beginners - Learn Python in 1 Hour](#)
  - [C++ Tutorial for Beginners - Learn C++ in 1 Hour](#)



AI tools can solve this simple homework instantly and likely with no errors. However, you should focus on understanding the key concepts, developing problem-solving skills, and, of course, double-checking AI-generated answers.

## List of Problems

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**Problem 1: Arithmetic Operations - 20 points**

In both Python and C++, define one integer variable and one float variable. Assign arbitrary values to each variable. Perform the following arithmetic operations on the variables and print the result of each of them.

1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation

**Problem 2: Conditionals - 20 points**

In both Python and C++, prompt the user for their age. Use a conditional statement to print the age classification according to the following rule:

1. Minor (Less than 18)
2. Adult (Between 18 and 65)
3. Senior (Greater than 65)

**Problem 3: Loops - 20 points**

In both Python and C++, write a loop to generate and print the [Fibonacci sequence](#) from its first sentence to its n-th sentence, where "n" is a predefined arbitrary value.

**Problem 4: Functions - 20 points**

In both Python and C++, write a function that takes three variables: "n", "d", and "word". The function should print "word" "n" times, with a "d" second interval between each print.

**Problem 5: Visualization - 20 points**

In both Python and C++, generate two sine waves with different frequencies and add noise (random values) to them. Plot the sine waves with noise on the same graph. Each signal should have distinct colors, and the plot should include a legend, title, and suitable labels for the x and y axes.



## Homework Guidelines and Instructions

- The deadline for sending this exercise will be until the end of Sunday, February 25.
- This time cannot be extended.
- The implementation must be in **both Python and C++** and your codes must be executable and uploaded along with the report.
- This exercise is done by one person.
- If any similarity is observed in the work report or implementation codes, this will be considered as fraud for the parties.
- If you do not follow the format of the work report, you will not be awarded the grade of the report.
- Handwritten exercise delivery is not acceptable.
- All pictures and tables used in the work report must have captions and numbers.
- A large part of your grade is related to the work report and problem solving process.
- Please upload the report, code file and other required attachments in the following format in the system: HW1\_[Lastname]\_[StudentNumber].zip  
For example, the: HW1\_Ezati\_12345678.zip
- If you have any questions or doubts, you can contact the teaching assistant through the following e-mail with the subject HW0\_Mechatronics&Robotics. Stay in touch educationally:
  - Ali Rashidi Moghadam: [AliRashidiMoghadam@gmail.com](mailto:AliRashidiMoghadam@gmail.com)
- Be happy and healthy