

6. Tutorial/practical exercises

Exercise 1

- 1 – Write an algorithm and a Python program that reads three integers. The program displays the biggest number among them.
- 2 – Give the flowchart of your algorithm.

Exercise 2

- 1 – Write an algorithm and a Python program to solve a first-order single-variable equation.
- 2 – Give the flowchart of your algorithm.

Exercise 3

- 1 – Write a Python program to solve a second-order single-variable equation. The program should indicate if the solutions are real or complex.

Remark: The program should compute the solutions even if they are complex. Note that Python has the type `complex`, but you should not use it.

Exercise 4

We revisit the parking lot. The company that runs the parking lot set fresh rules for calculating costs. Customers should pay:

- No charge for the first 30 minutes.
- 25 DA each time slot (30 minutes) for parking less than 4 hours.
- After 4 hours, the customer pays 5 DA for each time slot.
- If the parking time exceeds one day, the client will be charged 1200 DA per day.

Write a Python program to calculate the amount a customer should pay based on this parking time in minutes. The program should print a detailed bill.

Exercise 5

Write a Python program that reads three positive reals that represent the lengths of three lines. The program indicates if these lines can make a triangle.

Exercise 6

Write a program that read a date: the day of the month, the month (as a number) and the year. The program should print the date in a full format. For instance, if the user provides 13/10/2024, the program should print Sunday 13 October 2024. To compute the day of the week, we use the Zeller's congruence:

$$h = \left(q + \left\lfloor \frac{26(m+1)}{10} \right\rfloor + k + \left\lfloor \frac{k}{4} \right\rfloor + \left\lfloor \frac{j}{4} \right\rfloor + 5j \right) \% 7 \quad (\text{Eq. 1})$$

with:

- q the day of the month
- m the number of the month. For January and February, the number is 13 and 14 (respectively) but the year is decremented by 1.
- j is the century ($\text{year} \% 100$)
- k is the year in a century ($\text{year} // 100$)
- h is the number of the day in a week: 0 for Saturday, 1 for Sunday, etc.