14BHD COMPUTER SCIENCE 2020/2021

Laboratory 1

Objectives

- To practice with flow charts and pseudocode
- To acquire confidence with the IDE (Integrated Development Environment)
- To acquire confidence with the Python language

Technical Contents

- Use of the various tools for programming
- Creating and running Python scripts
- Use of print function

Preferably to solve in the lab

Exercise 1. You want to find out which fraction of your car's use is for commuting to work, and which is for personal use. You know the one-way distance from your home to work. For a particular period, you recorded the beginning and ending mileage on the odometer and the number of workdays. Write an algorithm to settle this question. [R1.16]

Exercise 2. Imagine that you and a number N of friends go to a luxury restaurant, and when you ask for the bill, you want to split the total amount and the tip (15 percent) between all. Write a pseudocode for calculating the amount of money that everyone has to pay. Your program should print the amount of the bill, the tip, the total cost, and the amount each person has to pay. It should also print how much of what each person pays is for the bill and for the tip. [R1.20]

Exercise 3. In a scheduling program, we want to check whether two appointments overlap. For simplicity, appointments start at a full hour, and we use military time (with hours 0–23). The following pseudocode describes an algorithm that determines whether the appointment with start time start1 and end time end1 overlaps with the appointment with start time start2 and end time end2.

If *start1 > start2*
  s = start1
Else
  s = start2
If *end1 < end2*
  e = end1
Else
  e = end2
If *s < e*
  The appointments overlap.
Else
  The appointments don't overlap.

1. Trace this algorithm with an appointment from 10–12 and one from 11–13, then with an appointment from 10–11 and one from 12–13.
2. Draw a flowchart for the algorithm. [R3.12]

Exercise 4. The following algorithm yields the season (Spring, Summer, Fall, or Winter) for a given month and day.

If *month is 1, 2, or 3, season = "Winter"*
Else if *month is 4, 5, or 6, season = "Spring"*
Else if *month is 7, 8, or 9, season = "Summer"*
Else if *month is 10, 11, or 12, season = "Fall"*
  If *month is divisible by 3 and day >= 21*
  If *season is "Winter", season = "Spring"*
  Else if *season is "Spring", season = "Summer"*
  Else if *season is "Summer", season = "Fall"*
  Else *season = "Winter"*

Draw a flowchart for the algorithm. Identify the inputs and outputs to the algorithm [R3.13]

To be solved at home

Exercise 5. Write a program that prints the sum of the first ten positive integers, 1 + 2 + … + 10. [P1.2]

Exercise 6. Write a program that prints the balance of an account after the first, second, and third year. The account has an initial balance of $1,000 and earns 5 percent interest per year. [P1.4]

Exercise 7. The ability to speak more than one language is a valuable skill in today's labor market. One of the basic skills is learning to greet people. Write a program that prints a two-column list with the greeting phrases shown in the following table; in the first column, print the phrase in English. In the second column, print the phrase in the language of your choice. If you don't speak any language other than English, use an online translator or ask a friend. [P1.16]

List of Phrases to Translate
Good morning.
It is a pleasure to meet you.
Please call me tomorrow.
Have a nice day!

Exercise 8. Write a program that displays your name inside a box on the screen, like this:

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+------+
¦ Dave ¦
+------+
```

Do your best to approximate lines with characters such as " | ," - ", " + ", " . ", " ¦ ". [P1.5]