FOR14
Algorithms and computer programming with Python
Autumn 2021

Practice assignment 2

The goal of this assignment is to help you practice decisions and loops.
For the algorithms you can give a description using English. The important thing is to keep clear what is the input, what is the output, and what are the steps to follow to obtain the desired output with the given input.
All the code must be delivered as part of this assignment and must be documented with comments explaining the steps you took.
Most of the questions in this assignment were taken from the book Python for Everyone, 3e.

1 Review questions

For the first section of the homework you need to provide the answers in a pdf or word file. Do not submit python code for the problems that are not requiring it.

Exercise R3.2 Explain the difference between

```
s = 0
if x > 0:
    s = s + 1
if y > 0:
    s = s + 1
```

and

```
s = 0
if x > 0:
    s = s + 1
elif y > 0:
    s = s + 1
```

Exercise R3.6 Suppose x and y are variables, each of which contains a number. Write a pseudocode fragment that sets y to the absolute value of x without calling the `abs` function. Use an if statement.

Exercise R3.11 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 then
    s = start1
else
```

```
        s = start2
    end if
    if end1 < end2 then
        e = end1
    else
        e = end2
    end if
    if s < e then
        The appointments overlap.
    else
        The appointments don't overlap.
    end if
```

Hand 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.

Exercise R3.12 Draw a flowchart for the algorithm in Exercise R3.11.

Exercise R3.15 Develop a set of test cases for the algorithm in Exercise R3.11.

Exercise R4.4 What do these loops print?

(a) `for i in range(1, 10): print(i)`

(b) `for i in range(1, 10, 2): print(i)`

(c) `for i in range(10, 1, -1): print(i)`

(d) `for i in range(10): print(i)`

(e) `for i in range(1, 10): if i % 2 == 0 : print(i)`

2 Programming exercises

For the exercises below you are asked to submit a python code file .py. Failing to submit the python code file will be counted as not submitted. Do not paste the code in the pdf file with the answers for the questions above. Get use to it because failing to submit your code in a proper file for the final will be deeply penalized.

Exercise P3.37 Write a program to simulate a bank transaction. There are two bank accounts: checking and savings. First, ask for the initial balances of the bank accounts; reject negative balances. Then ask for the transaction; options are deposit, withdrawal, and transfer. Then ask for the account; options are checking and savings. Then ask for the amount; reject transactions that overdraw an account. At the end, print the balances of both accounts.

Exercise P3.38 Write a program that reads in the name and salary of an employee. Here the salary will denote an hourly wage, such as $9.25. Then ask how many hours the employee worked in the past week. Be sure to accept fractional hours. Compute the pay. Any overtime work (over 40 hours per week) is paid at 150 percent of the regular wage. Print a paycheck for the employee.

Exercise P4.32 Your company has shares of stock it would like to sell when their value exceeds a certain target price. Write a program that reads the target price and then reads the current stock price until it is at least the target price. Your program should read a sequence of floating-point values from standard input. Once the minimum is reached, the program should report that the stock price exceeds the target price.

Checking palindromes A string is a palindrome if it reads the same forward and backward. The words “mom”,“dad”,and “noon”, for instance, are all palindromes. The problem is to write a program that prompts the user to enter a string and reports whether the string is a palindrome.