

Computational Thinking and Problem Solving (COMP1002) and Problem Solving Methodology in Information Technology (COMP1001)

Assignment 1 (Due on 7 October 2021 (Thu) at 12:00 noon)

1. [10 marks] Suppose you are given a positive integer. Write down the pseudocode of finding its binary representation. Also write down the input and output specifications.
2. [20 marks] Suppose you are given the following text string.

COMP has made significant contributions to research that makes impact, keeping up with the knowledge advancement and global development in computing and information technology and facilitates technology transfer. It engages in a full and extensive spectrum of six research areas, including Artificial Intelligence and Robotics; Cyber Security and Privacy; Data Science, Information Retrieval and Human Computer Interaction; Fundamentals and Software; Networking and Mobile Computing; and Vision, Language and Graphics. It demonstrates its research capabilities through impressive records of winning competitive research grants, high-quality publications in prestigious journals and conferences, and strong industrial collaborations.

Write down the pseudocode, in details, how you can systematically count the number of each English word in the text, which has 5 or more letters, in the word. Note that there are punctuations in the text string and your pseudocode should mention how you deal with them.

3. [20 marks] In Lecture 2, the difference between function and procedure is mentioned. Suppose there are two persons, Alice and Bob. One day, Alice asks Bob to complete a task for her. That is, Bob has to buy 3 oranges, 2 apples and 6 eggs, using the money collected from Alice. Bob has to put the items on a table. Before that, Bob has to clean the table first.

Does Bob act like a function or a procedure? What are the input(s) and output(s), if any? Justify your claim.

4. [12 marks] Use the Python command line console to show the steps for the conversion of an integer, 17, to its binary representation. Screen-capture your steps and outputs. What is the binary representation of 17?
5. [20 marks] Based on the conversion problem in Q.4, create a Python program that a user enters a valid positive integer in base 10, and the system will display the corresponding binary number. You need to provide three test cases (i.e., input and output) to verify your program. One of the cases should be the one in Q.4. Type the test cases in terms of comment at the beginning of your program. Other than those for data input and output, no built-in/external functions can be used.
6. [18 marks] Write a Python program to calculate the area of a triangle as below:
 - A user is asked to provide the lengths of 3 sides of a triangle;
 - The program will calculate and display the triangle area using Heron's formula; otherwise, if the calculation result is not valid, the program will display an error message.

You may assume the user always input numbers to the program.

Other than those for data input and output, no built-in/external functions can be used.

(Hints: You may refer to https://en.wikipedia.org/wiki/Heron%27s_formula or other sources for more information.)

Submission Instructions

Follow the steps below:

1. Create a folder and name it as <student no>_<your name>, e.g., **12345678d_CHANTaiMan**
2. For Q1, Q2, Q3 and Q4, type your answers in a word document and save it as a **.pdf** file. Name the single **.pdf** file as A1_<student no>_<your name>.**.pdf**, e.g., **A1_12345678d_CHANTaiMan.pdf**
3. For Q5 and Q6, submit the source file (**.py**). Name the **.py** files as A1_Q<question no>_<student no>_<your name>.**.py**, e.g., **A1_Q5_12345678d_CHANTaiMan.py**
4. Put all the **.pdf** and **.py** files into the folder created in Step 1.
5. Compress the folder (**.zip**, **.7z**, or **.rar**).
6. Submit the file to Blackboard.

A maximum of **3 attempts** for submission are allowed. **Only the last attempt will be graded.** A late penalty of 5% per hour will be imposed.

Any wrong file naming and submission will be given ZERO mark. If you are using Windows, the file extension may be hidden by the operating system. Follow the steps of below links to make sure the file extension is not hidden:

<https://www.howtohaven.com/system/show-file-extensions-in-windows-explorer.shtml>

If your program cannot be run successfully (i.e., having any syntax error(s)), ZERO mark will be awarded for that program, regardless of how much you have coded.

This assignment is an individual work. All work must be done on your own. Plagiarism is serious offence. You are not allowed to consult any external channels, e.g., discussion forums, and copy code from any web resources, to assist your completion of your assignments. The Moss (<https://theory.stanford.edu/~aiken/moss/>) system will be adopted for plagiarism checking for program code. Submissions with high similarity, in terms of code patterns and structures, in addition to direct-copy-and-paste, will be extracted and reviewed. Any plagiarism cases (both copier and copier) will be given ZERO mark plus a deduction of the maximum mark of this assignment. Serious cases would be submitted to the Student Discipline Task Group (SDTG) of the department for further disciplinary actions.