

COMP1010 Assignment 1

Submission deadline: 11:59 pm, 9 October 2025

Question 1: Analyze the following pseudocode segments and determine their outputs [20 Points]

Segment 1:

```
j = 2
repeat
  print j
  j = j * 2
until j > 16
```

Segment 2:

```
k = 1
while k <= 8 do
  if k % 3 = 0 then
    print k
  k = k + 2
```

Segment 3:

```
for i in [1 .. 4]: # includes both 1 and 4 in range
  for j in [i .. 4]:
    print i, j
```

Requirements:

1. Manual Tracing (10 points): Show the step-by-step execution for each segment in a tabular format
2. Output (7 points): List the exact output for each segment
3. Loop Classification (3 points): Identify whether each loop involves definite or indefinite iterations

Question 2: Create a program that converts a decimal number to binary, and hexadecimal representations, then verifies the conversion by converting back to the original number. The same program must be able to do all conversions. [40 Points]

Requirements:

1. **Pseudocode** (15 Points): Write detailed pseudocode for the conversion algorithm using the division method covered in Lecture 2.
2. **Python Implementation** (15 Points): Implement the conversion functions. Do not use the built-in Python functions or external libraries.
3. **Verification** (10 Points): Include a verification step that converts back to decimal

Test Cases: Try following decimal numbers to check your code: 10, 29702, 123456789

Question 3: The Fibonacci series is a sequence of numbers where each number is the sum of the two preceding ones, starting with 0 and 1. Design a program that generates the first N numbers in the Fibonacci sequence using an indefinite loop, where N is a positive integer provided by the user. [40 Points]

Requirements:

1. **Pseudocode** (15 points): Write pseudocode that represents your approach
2. **Python Implementation** (15 points): Implement the pseudocode in Python
3. **Efficiency** (10 points): Calculate the efficiency of your code in terms of number of loop iterations for any **3 distinct** values of N.

Test Case: Generate the first 10 Fibonacci numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

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, and Q3, 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 Q2 and Q3, submit the source files (**.py**). Name the **.py** files as A1_Q<question no>_<student no>_<your name>.**py**, e.g., **A1_Q2_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 20% per day will be imposed.

A corrupted file will be given ZERO marks. It is your obligation to check carefully the files in your submission.

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)) when it is triggered, ZERO marks will be awarded for that Python program, regardless of how much you have coded.

This is an individual assignment. All work must be done on your own. Plagiarism is a serious offence. You are not allowed to consult any external channels, e.g., discussion forums, or 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 copiee) will be given ZERO marks plus a deduction of the maximum mark of this assignment. Serious cases will be submitted to the disciplinary committee of the department for further actions.

The use of GenAI tools such as ChatGPT for this assignment is strictly forbidden