

CSC 106 Spring 2018

Assignment 1

Due Jan 26, 11:55 pm

To complete this assignment, you should hand in 4 files:

- q1.pdf
- q2.pdf
- q3.pdf
- q4.png

Note that the first three questions should be handed in as a **PDF file**. Do not hand in any other files such as Microsoft Word files (e.g. doc). Question 4 needs to be handed in as a proper screenshot in .png format (i.e. not a picture taken with a smartphone).

Q1) Pseudocode and Flow Charts (2 marks)

Below is Figure 1.2 from the textbook, which describes an algorithm for adding two positive numbers together. **Convert this pseudocode into a flow chart.**

FIGURE 1.2

Given: $m \geq 1$ and two positive numbers each containing m digits, $a_{m-1} a_{m-2} \dots a_0$ and $b_{m-1} b_{m-2} \dots b_0$

Wanted: $c_m c_{m-1} c_{m-2} \dots c_0$, where $c_m c_{m-1} c_{m-2} \dots c_0 = (a_{m-1} a_{m-2} \dots a_0) + (b_{m-1} b_{m-2} \dots b_0)$

Algorithm:

- Step 1** Set the value of *carry* to 0
- Step 2** Set the value of *i* to 0
- Step 3** While the value of *i* is less than or equal to $m - 1$, repeat the instructions in Steps 4 through 6
- Step 4** Add the two digits a_i and b_i to the current value of *carry* to get c_i
- Step 5** If $c_i \geq 10$, then reset c_i to $(c_i - 10)$ and reset the value of *carry* to 1; otherwise, set the new value of *carry* to 0
- Step 6** Add 1 to *i*, effectively moving one column to the left
- Step 7** Set c_m to the value of *carry*
- Step 8** Print out the final answer, $c_m c_{m-1} c_{m-2} \dots c_0$
- Step 9** Stop

Algorithm for adding two m -digit numbers

The following three consecutive questions build on one another

Q2) Question 2: pseudocode [2 marks]

Envision an algorithm that when given any number n , prints out the sum of 1 to n .
E.g. given 6 the algorithm would print 21 (because $1 + 2 + 3 + 4 + 5 + 6 = 21$)

Write pseudocode for this algorithm using iteration (looping).

Now modify the algorithm (and pseudocode) so it prints out the sum of even, and uneven numbers as well as the total sum.

For example if n was 6 it would print:

Even numbers sum: 12
Uneven numbers sum: 9
Total sum: 21

Again, to get marks, the algorithm needs to work for any n given.

Q3) Question 3: Flowchart [2 marks]

Create a flow chart from your pseudocode answer to **Question 2**

Q4) Question 4: Python implementation [4 marks].

Now implement your solution to Question 3 in Python using the application provided at <http://www.codeskulptor.org/>

Once your application is running properly, please take a screenshot (not a picture with your phone) and save it as q4.png

In order to get marks the picture needs to show your code, the output and the unique url associated with your solution.