COMP108 Data Structures and Algorithms

Week 02 Tutorial Exercises Due: 07 February 2025, 5:00pm

(Late submission accepted until Monday 9:00am)

2020, 0.00pm

Information

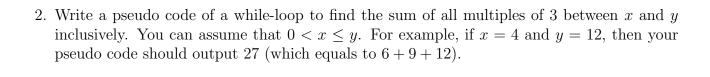
- Handwrite/typeset your answers and make it into a single pdf file. See this guide on how to scan documents to pdf.
- Submission: Submit a file named **COMP108W02.pdf** on Canvas Late submission is only accepted until Monday 9:00am.
- Submission of lab/tutorial exercises contributes to 10% of the overall module mark. Submission is marked on a pass/fail basis you will get full marks for submitting a reasonable attempt.
- Individual feedback will not be given, but solutions will be posted promptly after the deadline has passed.
- These exercises aim to give you practices on the materials taught during lectures and provide guidance towards preparation of examination.
- Relevant lectures: Lectures 1-3
- Turn to next page for the questions.

1. Consider the following algorithm.

```
// Assume n is a given integer being power of 2 count \leftarrow 0 x \leftarrow n while x > 1 do begin x \leftarrow x/2 count \leftarrow count + 1 end output count
```

(a) Give the **trace table** and the **output** of the above algorithm when n = 32.

(b) In general, how many times the while loop is executed for input n being a positive power of 2 (e.g., when $n=2,4,8,16,32,64,\ldots$)?



- 3. A prime number is a number that can be divisible by 1 and itself only. Write a pseudo code of an algorithm to determine if a positive integer x > 1 is a prime number or not.
 - Hints: (1) We can use a loop to check for each integer i smaller than x whether x is divisible by i. (2) If we want to make it quicker, we can stop earlier, the question is when should we stop the loop. (3) You can use the % operator to find remainder, e.g., a%b gives the remainder of a divided by b.