# COS10003 Computer and Logic Essentials – Assignment 1

**Semester 1 2021**

## Aim

This assessment task allows you to demonstrate your problem solving ability on problems covering data representation. It is worth **10%** of your final mark for this unit.

## Due date

This assignment is due **11:59pm Sunday 21 March 2021**.

## Due date and submission

Each individual student should submit their assignment via Canvas before the deadline. You can submit several times before the deadline; each new submission will overwrite your previous submission.

Before submitting the assignment, please ensure that you have undertaken the following activities:

- Checked Canvas for announcements/discussions related to the assignment and for any updates/clarifications;
- Ensured that the work submitted by you is your original work. If this is not the case, then further investigation will take place and a penalty or sanction may be applied. Note this includes:
  - sharing your original work with other students either on purpose or by accident – under no circumstances should you show or give your assignment to another student, nor should you ask to see another student's assignment;
  - soliciting answers from online forums and tutoring sites (even if money has **not** changed hands);
  - copying answers publicly posted online.
- Reviewed the declaration at https://www.swinburne.edu.au/current-students/manage-course/exams-results-assessment/submit-work/assessment-declaration/. Electronic submission of

your assignment signifies that you agree with this declaration. Note a cover page is not required, however please put your preferred name and student ID on at least the first page, ideally all pages.

If you have exceptional circumstances that mean you are unable to submit the assignment by the due date and time, please contact the convenor as soon as practicable *prior to the due date*. Note evidence of circumstances will be required.

**For students with EAPs allowing extensions:** you are required to request an extension *on or before the Friday before the due date* by emailing the convenor and nominating your ideal due date. In general, up to seven days' extension can be allowed; any more than this will most likely require an alternative assessment task or a hint to withdraw from the unit.

## General instructions

This is an individual assignment. It is preferred that you use word processing software to create your submission; if handwriting is required or preferred please scan your document as a **single** PDF rather than submitting images.

Before submitting, please check that your PDF contains all your images, working, and text. After submitting, please check that the submitted document is as you expected; instructions for how to do this are in Canvas. With the number of submissions we expect, **we are unable to inform you individually that your submission appears to be incomplete**. Resubmissions are allowed only during the late submission window and will attract a late penalty.

## Marking scheme

Marks will be awarded in accordance with the scheme allocated for each sub-part of the problems as indicated in the assignment. Partial marks will be awarded to the extent that the component parts of the question have been correctly answered. Please note that if a problem requires the answer to be justified, no marks will be awarded for simply giving the correct answer.

## Stars

The stars suggest the difficulty of the problem:
⋆ Should be straightforward based on lecture and tutorial material.

⋆⋆ Should be more challenging but still based on lecture and tutorial material.
⋆ ⋆ ⋆ Might require some further thought or extra research beyond lecture and tutorial material.

# Questions

**Important**: For questions 1 and 2, there are different values to work with depending on your surname. Look in Canvas for further details regarding your starting point.

Your responses to the following questions must show your reasoning (or working out). No marks will be provided for correct answers alone. Non-decimal numbers have a prefix indicating their base.

1. [2+2+4=8 marks] For the values given below *for your starting point only*, determine the requested value:

Starting point 1: a) 436, b) -90, c) 113.75

Starting point 2: a) 675, b) -78, c) 114.5

Starting point 3: a) 1474, b) -114 c) 79.125

a) ⋆ the hexadecimal representation of the decimal value

b) ⋆ the 8-bit two's complement representation of the negative decimal value

c) ⋆⋆ the IEEE 754 single precision floating point representation of the decimal value. Please write your final answer with spaces between the sign, exponent, and mantissa.

*Marking guide:* for a) and b), 1 mark for a correct answer and 1 mark for appropriate working, 0 marks for a correct answer only. For c), 3 marks for the process and 1 mark for the answer – this includes clearly showing the steps to find each part of the IEEE 754 representation.

2. [2+2+2+2=8 marks] Given the 16-bit binary string below *for your starting point only*, determine its value as requested.

Starting point 1: 0011 0110 1101 0100

Starting point 2: 0101 0111 1010 0110

Starting point 3: 0010 1110 1001 1010

a) ⋆ A hexadecimal value.

b) ⋆⋆ Two 8-bit unsigned integers as decimal values.

c) ⋆⋆ Two 8-bit signed integers (two's complement) as decimal values.

d) ⋆⋆⋆ One half-precision (16 bit) floating point value as a decimal value.

*Marking guide:* 0 marks for answers only, even if correct. 1 mark for a correct answer and 1 mark for working; note an answer might be correct with incorrect working, and working with minor errors might also attract 1 mark out of 2, even if the final answer is incorrect.

3. [4 marks] ⋆⋆ You have been given the following code which represents some Unicode characters in UTF-8 encoding. Explain briefly how you detected the characters (note you are expected to demonstrate this in binary/octal). Express the message contained as Unicode code points.

c2 b9 f0 9d 9f ba 39 e2 a0 a1

Hint: A resonably well-known sequence.

*Marking guide:* 0 marks for an answer only, even if correct. 1 mark for each step in the process – there are four steps – leading to a correct answer. The hint does not need to be solved for full marks.