

CS2100 (AY2011/2 Semester 2)  
Assignment #1

Name: _____
Tutorial Group: _____ Marks: / 20

This first assignment is given out during lecture. Unlike tutorials which you may discuss among your coursemates, you are to work on assignment questions **all by yourself**. Hence, please do not discuss the questions among yourselves or on the IVLE forum before the deadline.

You do not need to show working. Only zero or full mark is awarded for each question; no partial credit will be awarded for a partially correct answer.

For this first assignment, you are to submit it at the beginning of your CS2100 lecture on **2<sup>nd</sup> February 2012, Thursday**. Late submission without valid reason will not be accepted. If you are unable to attend the lecture on 2<sup>nd</sup> February 2012, please submit your assignment to Aaron (at COM1-03-12) any time before 3pm, 2<sup>nd</sup> February 2012.

(Subsequent assignments will be uploaded on the IVLE workbin, and you are to download them and submit your answers to the workbin before the stipulated deadline.)

1. For each of the following, determine what base  $b$  the numbers are in so that the operation is correct. [4 marks]

(a)  $2_b + 3_b = 11_b$  Answer:  $b =$

(b)  $21_b / 3_b = 5_b$  Answer:  $b =$

(c)  $31_b \times 13_b = 423_b$  Answer:  $b =$

(d)  $1A_b + 2B_b = 46_b$  Answer:  $b =$

2. (a) Convert  $(101101)_{\text{Gray}}$  into its equivalent binary value. [1 mark]

$(101101)_{\text{Gray}} = ( \quad )_2$

(b) Convert  $(011011)_2$  into its equivalent standard Gray code value. [1 mark]

$(011011)_2 = ( \quad )_{\text{Gray}}$

3. Given a floating-point representation of 1-bit sign, 6-bit normalized mantissa, followed by 9-bit exponent in 1s complement, which of the following decimal values cannot be represented accurately in this representation? [1 mark]

- A. 0.03125
- B. 16.5
- C. 128
- D. -20.75
- E. -160

Answer: (      )

*(Please turn over...)*

4. You are told that a certain 4-bit decimal code is **self-complementing** (like 2421 and 84-2-1 codes). You are also told that the decimal number 253 is represented in this decimal code as: 1110 0010 1010.

How many possible ways are there to represent the decimal number 487 in this code? [1 mark]

**Answer:**

5. Convert the hexadecimal (base 16) value **A5.7C** into quaternary (base 4), correct to 2 places as accurately as possible. [2 marks]

**Answer:**

6. How do you represent the decimal value 1234 in the IEEE 754 single-precision representation? Write your answer in **hexadecimal form**. [2 marks]

**Answer:**

7. What is the **Hamming distance** of the following code C with 5 code values? [2 marks]

{ 10110, 11001, 01010, 01101, 11011 }

**Answer:**

8. The following 6-bit data is to be converted into Hamming code: **101001**. Insert the appropriate parity bits, assuming even parity scheme. Write out the code (containing the data bits as well as parity bits). [4 marks]

**Answer:**

9. Suppose a Hamming code, including data bits and parity bits, is received as **1010110100**. Assume even parity scheme.

Can you determine which bit is in error? Hence write out the corrected code, with the corrected bit underlined. [2 marks]

**Answer:**