

CS2208a Assignment 1

Issued on: Wednesday, September 25, 2013

Due by: 11:55 pm on Wednesday, October 2, 2013

- For this assignment, **only electronic submission** at owl.uwo.ca is required.
- ONLY user **Courier New** font.
- Leave **one empty line** and **a line of “\$”** between the answer of each question.
- Leave **one empty line** and **a line of “%”** between the answer of each subsection in each question.
- *Write the question number is a separate line followed by an empty line*

Your submission should look like that:

Q1 (a)

Write here your answer.

Write here your answer.

Write here your answer.

% %

Q1 (b)

Write here your answer.

Write here your answer.

Write here your answer.

\$

Q2 (a)

Write here your answer.

Write here your answer.

Write here your answer.

% %

and so on

Failure to follow the above format may cost you 10% of the total assignment mark.

- Late assignments are strongly discouraged
 - 10% will be deducted from a late assignment (up to 24 hours after the due date/time)
 - After 24 hours from the due date/time, late assignments will receive a zero grade.

You must show your work and/or reasoning when answering the following questions. Solutions that do not show how an answer was obtained will receive a grade of ZERO.

QUESTION 1 (8 marks)

What are the decimal equivalents of the following unsigned integer values?

- a. 11001100_2
- b. 11001100_3
- c. 11001100_4
- d. 11001100_8

QUESTION 2 (4 marks)

Convert the following unsigned decimal numbers into binary form:

- a. 10000_{10}
- b. 1000000_{10}

QUESTION 3 (4 marks)

Convert the following unsigned hexadecimal numbers into octal form:

- a. FEDC.BA₁₆
- b. ABCD.EF₁₆

QUESTION 4 (4 marks)

Convert the following unsigned octal numbers into hexadecimal form:

- a. 12345.67_8
- b. 76543.21_8

QUESTION 5 (8 marks)

For each of the following numbers, state the base in use; that is, what is r, s, t, u?

- a. $25_r = 17_{10}$
- b. $25_s = 23_{10}$
- c. $1010_t = 68_{10}$
- d. $1001_u = 126_{10}$

QUESTION 6 (4 marks)

Convert the following **negative** decimal numbers into binary two's complement form:

- a. -12345_{10}
- b. -9876_{10}

QUESTION 7 (6 marks)

Convert the following **negative** decimal numbers into binary two's complement forms with 10 binary fraction digits:

- a. -12.34567_{10}
- b. -98.76543_{10}

QUESTION 8 (6 marks)

What does the binary bit pattern $1010\ 1010_2$ represent in decimal, if it is interpreted as:

- a. an unsigned value?
- b. a signed-magnitude value?
- c. a two's complement value?

QUESTION 9 (6 marks)

What does the binary bit pattern 1010.1010_2 represent in decimal, if it is interpreted as:

- a. an unsigned value?
- b. a signed-magnitude value?
- c. a two's complement value?

QUESTION 10 (12 marks)

Perform the following additions in a *two's complement 8-bit system*, showing your additions in binary. For each result indicate if an overflow occurred or not. How can you tell?

- a. $1010\ 1010 + 1111\ 1111$
- b. $0101\ 1111 + 0111\ 0101$
- c. $1111\ 0101 + 0101\ 0101$

QUESTION 11 (12 marks)

Convert the following decimal numbers into 32-bit IEEE floating-point form:

- a. -1234.875_{10}
- b. $+7654.3_{10}$

QUESTION 12 (12 marks)

Convert the following 32-bit IEEE floating-point numbers into decimal form:

- a. $FEDCBA98_{16}$
- b. $89ABCDEF_{16}$

QUESTION 13 (14 marks)

Perform the following arithmetic operations assuming that the operands are 32-bit IEEE floating-point numbers, showing your additions in binary.

Convert the results into 32-bit IEEE floating-point form

- a. $FEDCBA98_{16} + 89ABCDEF_{16}$
- b. $00FCD6EB_{16} + 80FCD6EA_{16}$