# COMP 189: Homework 2

Assigned January 17, 2020

Due 11:59 PM January 24, 2020

*58 points total*

## Technical Exercises

*For each problem, show all your work (required for credit). For answers requiring written answers, while no more than five or six sentences are expected, sufficient justification must be given for any position, opinion, or perspective taken.*

**1. Binary Representation (8 pts)**

Represent the following objects in binary using the formats described in class (or specified below). *(2 pts each)*

1. The number 5410

5410=1101102

1. The number 23510 using 12 bits.

23510=0000 1110 10112

1. What is 0011 0110 00112 in decimal notation?

0011 0110 00112=86710

1+2+32+64+256+512=867

1. A 1x2 image containing a super (max intensity) red pixel and a black pixel. Use 4 bits for width and 4 bits for height and 2 bits for each color component.

0001 for width is 1

0010 for height is 2

110000 for the first intensive red pixel

000000 for the second intensive black pixel

0001 0010 1100 0000 00002

**2. Number systems (10 pts)**

Some wise-girl engineer has invented a computer that uses a base-4 system for representing numbers. For the sake of representation, the numeric symbols are 0, 1, 2, 3. Answer the following questions about this representation system.

1. How many values can be represented by a single character in the base-4 system? (2 pts)

a single character can represent four different values, since we can use 0,1,2,3 instead of 0,1 in the binary system.

1. What is the maximum numeric value that can be represented by two symbols in the base-4 system? (3 pts)

334=1510

3\*(4^0) + 3\*(4^1) = 15

1. Convert 0032304 into its binary equivalent. (5 pts)

0032304=3\*(4^1) + 2\*(4^2) + 3\*(4^3) = 12+32+192=23610

23610 = 111011002

0032304 = 111011002

**3. ASCII Representation (10 pts)**

Answer the following questions about ASCII representation.

1. What ASCII character does 0001 00002 denote? *(2 pts)*

0001 00002 = 1\*2^4 = 1610

denotes to control character DLE

1. Express “COMP 189” in binary. *(2 pts)*

C: 0100 0011

O: 0100 1111

M: 0100 1101

P: 0101 0000

“ ”: 0010 0000

1: 0011 0001

8: 0011 1000

9: 0011 1001

COMP 189:

0100 0011 0100 1111 0100 1101 0101 0000 0010 0000 0011 0001 0011 1000 0011 10012

1. What are the table indices of “a”, “A”, “h”, “H”, “q”, and “Q”? (2 pts)

“a”: 97

“A”: 65

“h”: 104

“H”: 72

“q”: 113

“Q”: 81

1. Using insights gained from the previous question, devise an easy arithmetic rule for converting alphabetic characters from upper to lower-case and visa versa (in the ASCII table). Show that your method works on the string “COMP 189”. (4 pts)

Lowercase = Uppercase + 32

“C”:67

“O”:79

“M”:77

“P”:80

“c”:99 = 67 + 32

“o”:111 = 79 + 32

“m”:109 = 77 + 32

“p”:112 = 80 + 32

**4. HTML Markup (25 pts)**

Find and use the HTML tags in order to achieve the text effects described. (Note: these and only these are the HTML tags that you are expected to have memorized for exam purposes.) *(3 pts each)*

1. “I **really** like COMP 189.'”

I <b>really</b> like COMP 189

1. “There is a *spider* on your head!”

There is a <i>spider</i> on your head!

1. “He shouted: (the rest of the text in font size 22) RUN FOR YOUR LIFE!!!”

He shouted: <font size=22 color=”[black]”> RUN FOR YOUR LIFE!!!</font>

1. A bulleted list of the following items: “pens”, “erasers”, “animal crackers”, “paper”

<ul>

<li>pens</li>

<li>erasers</li>

<li>animal crackers</li>

<li>paper</li>

</ul>

1. The following text with the underlined portion linked to http://www.mcgill.ca: “I like my school a lot.”

I like <a href=”http://www.mcgill.ca” >my school</a> a lot

1. Find two different ways of using HTML tags to make a word in a sentence bigger than the text around it.

Two ways:

1. Use the tags<big></big>to make the word bigger than its surroundings.

I like <big>my school</big> a lot.

2. Use the <font size=## color=”[color]”></font> to set the font size of the text, and make the word you want to emphasize bigger than its surroundings.

<font size=50 color=”[black]”>I like</font> <font size=100 color=”[black]”>my school</font> <font size=50 color=”[black]”>a lot. </font>

1. Make a three column, four row table listing three of the classes in your course schedule. First column is class name, second column is instructor, and third column is the number of credits. The first row should be a header row - and all text in this row should be larger and bold. *(7 pts)*

<table>

<tr>

<td><header><big><b>class name</b></big></header></td>

<td><header><big><b>instructor</b></big></header></td>

<td><header><big><b>number of credits</b></big></header></td>

</tr>

<tr>

<td>MATH240</td><td>Prof. Macdonald</td><td>3</td>

</tr>

<tr>

<td>COMP250</td><td>Prof. Giulia</td><td>3</td>

</tr>

<tr>

<td>MATH151</td><td>Prof. Roth</td><td>4</td>

</tr>

</table>

## Discussion

**5. Western bias? (5 pts)**

It's been argued that computers reflect an early western engineering bias. Make an argument for this based on the ASCII character table --- both content and size.

For the content, the ASCII table only includes the characters and letters in English alphabet. The numbers only include digits from 0 to 9. The letters in some Eastern culture are not included in the ASCII table, like Japanese, Chinese and Korean letters. Moreover, the digits in Roman are not included in ASCII table, like Ⅰ,Ⅱ,Ⅲ and Ⅳ.

For the size, the ASCII table only set 8 bits for each character. Even though different 256 values are enough to express English letters, they are not enough for other languages system. Take Chinese as an example. There are approximately hundred thousand of letters in Chinese. 8 bits are unable to express these letters.

In summary, ASCII table only includes western characters, and the size, 8 bits, are unable to express some other languages. Consequently, it is fairly to say that the computers reflect an early western engineering bias.