### 1. Edible Numbers (aka Computer Data/Memory Sizes and Names)

In our second class we discussed the graphic below. Think deeply and see if you can answer the questions below based on your understanding of this new computer terminology.



a) How many *bits* are there in a *nibble*? \_\_\_\_\_\_\_\_

b) How many *bits* are here in a *byte*? \_\_\_\_\_\_\_\_

c) How many *nibbles* are there in a *byte*? \_\_\_\_\_\_\_\_

d) It seems 1-, 4- and 8-bit groups have names. Suggest a name for a group of **2** bits. \_\_\_\_\_\_\_\_

e) Each bit can be a 0 or a 1. How many *different* numbers can a *nibble* hold? \_\_\_\_\_\_\_\_

f) Considering your answer to e) and knowing the smallest number a nibble can hold is zero, what must the *largest* number be? \_\_\_\_\_\_\_\_

g) Can you confirm your answer to f) in another way?

h) Write the *largest* binary number a byte can hold (*in binary*) \_\_\_\_\_\_\_\_\_\_\_\_

i) What is the decimal or base 10 equivalent of your answer to h)? \_\_\_\_\_\_\_\_

j) What is the base 10 (decimal) equivalent of each of the following base 2 (binary) numbers?

i) 112 \_\_\_\_\_\_\_\_

ii) 1112 \_\_\_\_\_\_\_\_

iii) 11112 \_\_\_\_\_\_\_\_

iv) 111112 \_\_\_\_\_\_\_\_

k) Examining your answer to j) identify a connection be the binary pattern and the decimal result.

### 2. Thank you! That’s Quite a Complement ☺…

a) Write down any random decimal number to the right between 0 and 255, **inclusive**. \_\_\_\_\_\_\_\_\_

b) Figure out the binary equivalent of your decimal number and enter it in the *byte* table below.



c) Rewrite your binary number from b), reversing the digits (0’s become 1s and 1s become 0s). This number is referred to as the **1s Complement** of b).



d) Add the two numbers from b) and c) and place the result in the *byte* table below.



e) Write down the binary number that would remain if we added 1 to the previous binary number.



f) The previous sequence of questions is of considerably significant in computing. Can you possibly imagine what it might relate to?

### 3. These Numbers Look a Little Shifty…

The number 310 written as a *nibble-sized* binary number is **00112** and the number 610 written as a *nibble-sized* binary number is **01102**.

a) How do the bits in the binary numbers **00112** and **01102** compare?

b) Write the decimal number 1210 as a *nibble-sized* binary number. \_\_\_\_\_\_\_\_2

c) Explain two ways to get the answer to b).

d) Consider the *byte-sized* binary number 100110002. Divide this number by 8 and write it below.

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