**CprE 288 – Homework Question Set 1**

## Question 1: C Variables and Number Representation

**Complete the table below.** Assume ASCII encoding of characters, and a 2’s complement encoding of negative numbers. When representing a number in hexadecimal or binary, **use the proper number of digits** for the TM4C123 architecture (depends on type of variable). The first row is already completed.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Value of x** | | |
|  | **x (decimal)** | **x (hex)** | **x (binary)** |
| signed char x = 60; | 60 | 0x3c | 0b00111100 |
| unsigned char x = 'K'; | 75 | 0x4A | 0b01001011 |
| unsigned char x = '7'; | 55 | 0x37 | 0b00110111 |
| short x = 0x0381; | 897 | 0x0381 | 0000 0011 1000 0001 |
| unsigned short x = 0x4060 + 0x2051; | 24753 | 0x60B1 | 0b0110 0000 1011 0001 |
| signed char x = 0x7 + 6; | 13 | 0x0D | 0b0000 1101 |
| unsigned int x = 0xE9; | 233 | 0x000000E9 | 0b0000 0000 0000 0000 0000 0000 1110 1001 |
| signed short x = -1; | -1 | 0xFFFF | 0b1111 1111 1111 1111 |
| signed char x = -128; | -128 | 0x80 | 0b1000 0000 |
| signed char x = -1; | -1 | 0xFF | 0b1111 1111 |
| int x = -1; | -1 | 0xFFFFFFFF | 0b1111 1111 1111 1111 1111 1111 1111 1111 |

* I used the **mgtslides02-03** that were on canvas to help me complete this problem and help with my similar question. In the actual lecture slides, slides 25 and 26 helped me understand how many bytes were used for each primitive type so that way when I started the problem I could convert from either decimal to binary using the right amount of bits and then from their turn it to hex still using the same amount of bits. Slide 51 over the PowerPoint also helped me because it had the ASCii table on there and so I was able to look up different characters and see what their decimal values were and then repeat my process from above.
* I believe that the question I chose relates to the key concepts **Data types and Data storage.** It appeared inside the question because it listed different data types like signed ints, chars, short and signed shorts and then continues by asking for the decimal, hex and binary number which would then show how much data needs to be allocated for an assignment of that type.

## Question 2 (My related question) : C Variables and Number Representation

VALUES OF X

|  |  |  |  |
| --- | --- | --- | --- |
|  | X (decimal) | X (hex) | X (binary) |
| signed char x = 55; | 55 | 0x37 | 0b0011 0111 |
| unsigned char x = 'A'; | 65 | 0x41 | 0b0100 0001 |
| unsigned char x = '9'; | 57 | 0x39 | 0b0011 1001 |
| short x = 0x0372; | 882 | 0x0372 | 0b0000 0011 0111 0010 |
| unsigned short x = 0x4160 + 0x2057; | 25015 | 0x61B7 | 0b0110 0001 1011 0111 |
| signed char x = 0xA + 3; | 13 | 0x0D | 0b0000 1101 |
| unsigned int x = 0xAAE9; | 43753 | 0xAAE9 | 0b1010 1010 1110 1001 |
| signed short x = -13; | -13 | 0xFFF3 | 0b1111 1111 1111 0011 |
| signed char x = -127; | -127 | 0x81 | 0b1000 0001 |
| signed char x = -44; | -44 | 0xD4 | 0b1101 0100 |
| int x = -17; | -17 | 0xEF | 0b1110 1111 |