Problem 1:

|  |  |  |  |
| --- | --- | --- | --- |
| **Number to Convert** | **Binary** | **Hexadecimal** | **Decimal** |
| 0x1400 | 0b1010000000000 | 0x1400 | 5120 |
| 64 | 0b1000000 | 0x40 | 64 |
| 0x248 | 0b1001001000 | 0x248 | 584 |
| 0b1101001101101100 | 0b1101001101101100 | 0xD36C | 54124 |
| 2304 | 0b100100000000 | 0x900 | 2304 |
| 0x1238 | 0b1001000111000 | 0x1238 | 4664 |
| 720 | 0b1011010000 | 0x2D0 | 720 |
| 0b11010100 | 0b11010100 | 0xD4 | 212 |

Problem 2:

1. -128

**First convert to binary: 10000000**

**Then flip the digits: 01111111**

**Then add 1 so you end up with 10000000**

1. 0x85

**First convert to decimal: 133**

**Then convert to binary: 0000000010000101**

**Then flip the digits: 1111111101111010**

**Then add 1 so you end up with 1111111101111011**

1. Is it possible to have a signed 8-bit representation for the number 128?

***In other words, does 128 fall inside the range of a signed 8bit number.***

**No it is not possible, the range goes from -127 -> 127**

|  |  |  |  |
| --- | --- | --- | --- |
| **Operand 1** | **Operand 2** | **Operation** | **Result** |
| 11 | 1 | ADD | **0xC** |
| 83 | 39 | ADD | **0x7A** |
| 6145 | 2056 | SUB | **0xFF9** |
| 60845 | 4680 | OR | **0xFFED** |
| 6055 | 4685 | XOR | **0x5EA** |
| 0xecb7 | 0xc0c0 | SUB | **0x2BF7** |
| 245 | 255 | AND | **0xF5** |
| 17 | 127 | OR | **0x7F** |
| 0xFF | 0xFF | XOR | **0x0** |
| 406 | 256 | AND | **0x100** |
| 300 |  | NOT **(~)** | **0xFED3** |

Problem 3:

Problem 4:

|  |  |
| --- | --- |
| **Number** | **Execution** |
| **122** |  |
| **100** |  |
| **127** |  |
| **128** |  |
| **129** |  |
| **200** |  |
| **256** |  |

## Question

1. Why does the unsigned value for 256 result in the value of 0? **1pt**

**Its greater than the range of 255 that 8 bits can represent**

1. Why does the entered value of 128 result in the output values of -128 and 128? **1pt**

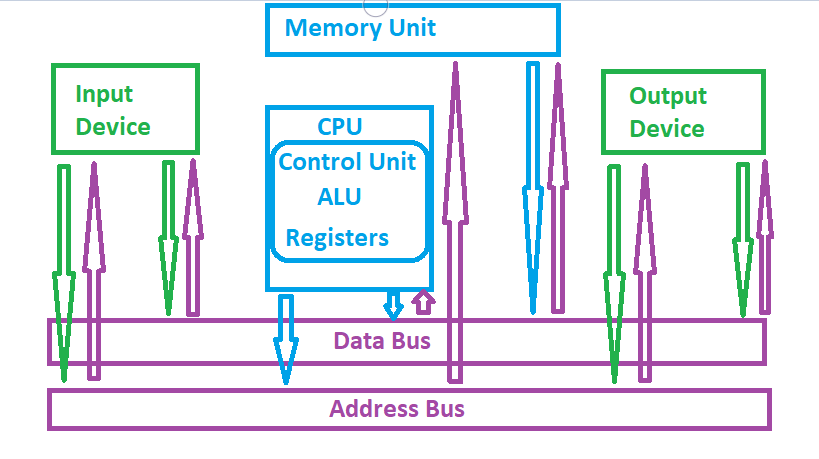
**The -128 is represented a signed number while the 128 is an unsigned number, and you can never see 128 in a signed 8 bit number as the range stops at 127**

1. Based on the input values; write a formula to predict the output of the unsigned values if the user entered values in the range 0-255? **2pts**

**if input = 0 -> 127, output = 0 -> 127 respectively**

**if input = 128 -> 255, output = -128 -> -1**

Problem 5:

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Problem 6:

**The diagram conforms to Harvard architecture as far as I can tell, the only thing to change would be the data bus so instruction memory does not access it.**