University of Notre Dame
Department of Electrical Engineering

EE 30321 **Embedded Systems** **Stevenson**

Assignment #2
Digital Representations and Systems

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1. How many bits does it take to represent 75 items?
2. Convert
   (a) 123 to binary
   (b) 76 to hex
   (c) 0xFD to binary
   (d) 0xC4 to decimal
3. Compute the following and provide the answers in hex
   (a) 0xB2 + 0x8F
   (b) 0xAA + 0x4F
   (c) 0xC7>> 2
   (d) 0xA4<< 1
4. Given a 40 percent duty cycle and a (high) pulse width of $20\mu s$, what is the clock frequency?
5. We designed an incrementer in class and used that to design a counter that counted up. Now assume you also have a decrementer, design a counter that can both count up and down.
6. Write you first name as a 8-bit hex values using ASCII encoding.
7. In a given byte-addressable computer, memory locations 0x10000 to 0x9FFFF are available for user programs (i.e. the first location is 0x10000 and the last location is 0x9FFFF. Calculate the following:
   (a) The total number of bytes available for user programs (in decimal)
   (b) The total number of kilobytes available for user programs (in decimal)
8. In the class designed "Turnstile Computer" the program we wrote will automatically lock the turnstile when the computer is reset. Rewrite the assembly language program so that upon reseting the computer, the turnstile is unlocked and remains unlocked until the first coin is inserted.