ECE3221 – Quiz # 2 **May 21, 2019** **Adam Wilson**

Name: ___SOLUTIONS____ Student #: _____ Signature: _____

Time limit: 30 min. Calculators not allowed. All programming questions relate to the NIOS II processor.

1. (1 mark) Use an assembler directive to tell the assembler to begin placing binary values at memory address 0x00001200.

____.ORG 0x00001200_____

2. (2 marks) Explain why switch debouncing is necessary when interfacing real switches to digital circuits:

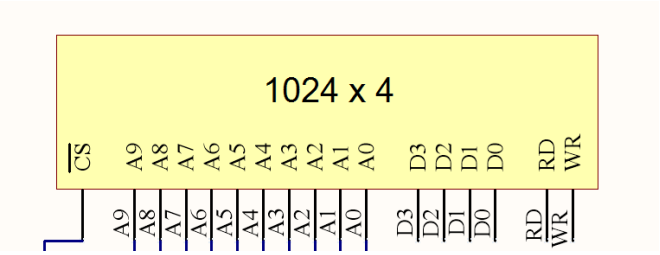
_____A real switch tends to produce a less-than-ideal voltage signal as it is pressed and_____

_____released. This results in multiple edges when a single edge is expected._____

3. (3 marks) List the 3 pieces of information that must be provided to the CPU of a computer when giving an instruction in machine language or assembly language:

_____**Operation** to be performed, **source** of operands, **destination** of result_____

4. (5 marks) Draw and label a block diagram of a single port **1024x4** read write memory chip. Ensure that the memory chip includes **an active low chip select line, all address lines, all data lines, a read line, and a write line**. What is the storage capacity of this memory chip in bytes?



1024 addresses x 4 bits per address = 4096 bits storage capacity
4096 bits / 8 bits per byte = **512 bytes** storage capacity

Name: ___SOLUTIONS____ Student #: _____ Signature: _____

5. (7 marks) Given the circuit below, the value in the source register (B) is to be copied into a destination register (C) by specifying a two-bit address for each. Single read and write signals are directed to the appropriate one-bit registers. Label completely the timing diagram to perform the register transfer. Assume output Q_B is initially 0 and output Q_C is initially 1.