ECE3221 – Quiz # 4 **June 3, 2019** **Adam Wilson**

Name: Student #: _____ Signature: _____

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

1. (4 marks) Complete the table below with the signed 8-bit binary values indicated.

Signed Decimal Value	Sign and Magnitude (8-bit)	2's Complement (8-bit)
+31		
-31		
+65		
-65		

2. (1 mark) A technique used to improve the efficiency of input (or output) operations of computer system by allowing writes (or reads) to (or from) memory directly without continual CPU interaction is called:

3. (1 mark) This unit serves as the interface between the processor and the computer buses of a computer. It initiates read and write operations by manipulating the address and control lines. What is this unit called?

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4. (2 marks) Show the assembly language instruction(s) required to convert an ASCII character that is stored in r8 to uppercase.

5. (3 marks) When a subroutine is called from the main program code using the **call** instruction, the processor branches to the area of memory where the subroutine is stored by updating the program counter with the address of the subroutine. Explain how the processor is redirected to continue to execute the instructions that follow the call instruction in the main program code following completion of the subroutine. Discuss the instruction(s) required and the registers involved:

6. (4 marks) Describe what the stack is in a computer program and how it may be used. List 2 common operations that are used to access the stack and describe the purpose of these operations.