

Name: _____ Student #: _____ Signature: _____

Calculators not allowed.

1. (6 marks) Write a subroutine that uses register r7 and r11 but does not affect them. The subroutine is to be called with the following statement: **call mysub**. Assume that the stack has already been allocated and initialized and that aliases have been created for the push and pop instructions (to push a register use: **push rN** and to pop a register use: **pop rN**, where N is the register number). The actual code that uses register r7 and r11 does not need to be written (just assume that it exists at the comment: **# code that uses r7 and r11 goes here**)

mysub:

push r7

push r11

code that uses r7 and r11 goes here

pop r11

pop r7

ret

2. (1 mark) The LEDs of your system are connected to an output port at address 0x00004567. Use an assembler directive to equate the text **LEDS** to the address of the output port to help clarify your code:

.EQU LEDS, 0x00004567

3. (1 mark) Write a single line of assembly code to divide the **signed** value stored in register r4 by 16 and store the result in register r5 using a shift instruction:

srai r5, r4, 4

4. (1 mark) What is the name of the subroutine that is executed when an interrupt occurs?

Interrupt Service Routine (ISR)

5. (1 mark) The **eret** instruction is used to return from the interrupt “subroutine”. What must first be done to ensure that the NIOS II processor returns to the proper instruction?

Must first subtract four from the ea register to complete the instruction that was left unfinished