CS 314 - Computer Organization

Southern Oregon University

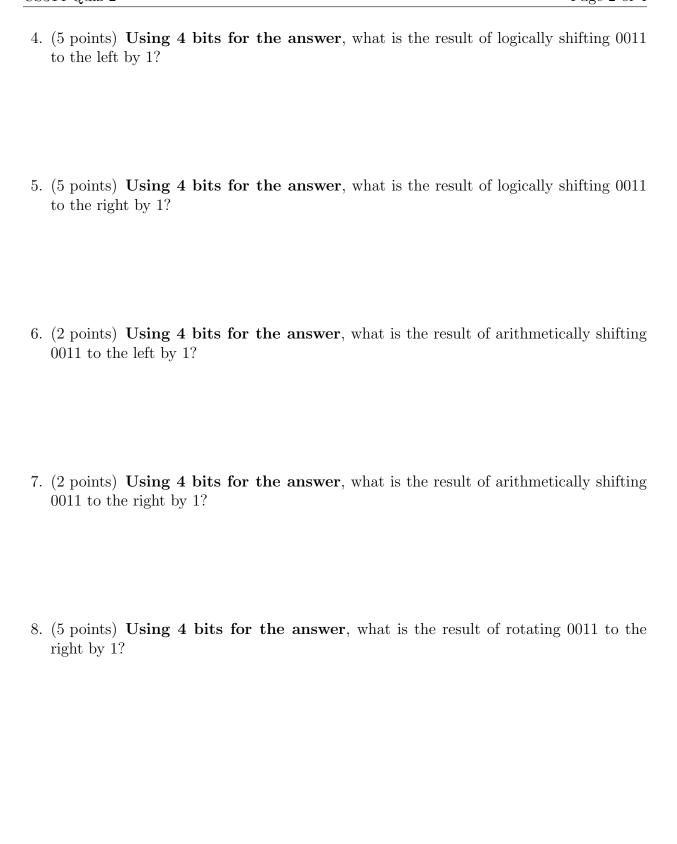Fall 2021

Quiz 2 - November 22nd, 2021

Time limit: 30 minutes

85 points

No notes, phones, or computers.

Name: _____

1. Write a single ARMv7-A assembly instruction that accomplishes each task.

   (a) (5 points) Add register r5 with register r3 and put the result in register r0.

   (b) (5 points) Load 32-bits from memory, starting at address SP + 4, into register r0.

   (c) (5 points) Store the contents of register r0 at the address in register r1.

2. (4 points) A **register** is ...
   - A. slower than main memory.
   - B. faster than main memory.
   - C. a logic gate.
   - D. the only place we can store values.

3. (4 points) The purpose of the **stack pointer** is to ...
   - A. point to the return address on stack.
   - B. point to the top of the stack.
   - C. point to the register stack.
   - D. point to the flexible second operand.

4. (5 points) **Using 4 bits for the answer**, what is the result of logically shifting 0011 to the left by 1?

5. (5 points) **Using 4 bits for the answer**, what is the result of logically shifting 0011 to the right by 1?

6. (2 points) **Using 4 bits for the answer**, what is the result of arithmetically shifting 0011 to the left by 1?

7. (2 points) **Using 4 bits for the answer**, what is the result of arithmetically shifting 0011 to the right by 1?

8. (5 points) **Using 4 bits for the answer**, what is the result of rotating 0011 to the right by 1?

9. (5 points) Write the bytes 0x12345678 in little-endian order.

10. (5 points) Write 0x12345678 in big-endian order.

11. (2 points) The ARM instruction set is more complicated than the x86 instruction set.
    A. True
    B. False

12. (3 points) What suffix, when added to an instruction, will cause it to update the flags in CPSR?

13. (3 points) What suffix, when added to an instruction, will cause it to execute only if the zero flag is set?

14. (5 points) If the program counter is currently at address 0x00000004 and a branch and link (BL) instruction is executed, what value will be put into the link register?

15. (10 points) Describe the the purpose of the function prologue and epilogue.

16. (10 points) Write an ARM assembly program that computes $1 + 2 + 3 + ... + N$ and stores the result in r0, where N is a value stored in register r1. Small syntax errors will be allowed, but this must be a full assembly program, not pseudocode.