Classwork 08 CPE 221 Computer Organization

Instructor: Rahul Bhadani

Spring 2025, UAH

Student's Name: _____

① Explain what do the following instructions do? (6 points)

(a) STR R6, [R7, R8, ROR #2]

This instruction computes R7 + (R8 rotated right by 2 bits), and then store the value of the register R6 in the address computed.

(b) LDRB R9, [R10, #-64]!

Loads a byte from the address value given by R10-64 into R9 and then decrement the value of R10 by 64.

(c) LDR R0, [R1], #4

Loads a word from R1 into R0, then increments R1 by 4. Then it updates R1 by adding 4 to its original value.

(5) Write a function in ARM, and its usage that adds four numbers. (10 Points)

Assuming that the first instruction starts at 0x00, what is the value of link register right after function has been called? What does Link Register do? (4 Point)

```
.global _start
_start:
0x00        MOV  R1, #2
0x04        MOV  R2, #3
0x08        MOV  R3, #4
0x0C        MOV  R4, #5
0x10        BL   sum
0x14  done: B    done

      sum:
0x18        ADD  R0, R1, R2     @ R0 = R1 + R2
0x1C        ADD  R0, R0, R3     @ R0 = R0 + R3
0x20        ADD  R0, R0, R4     @ R0 = R0 + R4
0x24        MOV  PC, LR
```

The value at the link regist is 0x14 after the function gets called. LR stores the address of the instruction that PC should set to once the function execution finishes.