# 컴퓨터구조 Assignment-3-답 (Fall 2019) - 50점 만점

**1.** (각 1점)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| 7000 3018 | 7000 3014 | 0A = $10_{ten}$ | 11 = $17_{ten}$ | ? |
| **6** | **7** | **8** | **9** | **10** |
| 7000 3004 | 6 | 0A = $10_{ten}$ | 64 = $100_{ten}$ | ? |

**2.** (각 5점)

**(1)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | add | | | | |
| CC2 | sub | add | | | |
| CC3 | and | sub | add | | |
| CC4 | and | sub | (b) | add | |
| CC5 | and | sub | (b) | (b) | add |
| CC6 | lw | and | sub | (b) | (b) |
| CC7 | or | lw | and | sub | (b) |
| CC8 | xor | or | lw | and | sub |
| CC9 | xor | or | (b) | lw | and |
| CC10 | sw | xor | or | (b) | lw |

**(2)**

| | IF | ID | EX | MEM | WB | ForwardA | ForwardB |
|---|---|---|---|---|---|---|---|
| CC1 | add | | | | | | |
| CC2 | sub | add | | | | | |
| CC3 | and | sub | add | | | | |
| CC4 | lw | and | sub | add | | | 2 |
| CC5 | or | lw | and | sub | add | 1 | |
| CC6 | xor | or | lw | and | sub | | |
| CC7 | sw | xor | or | lw | and | 1 | |
| CC8 | | sw | xor | or | lw | | 2 |
| CC9 | | | sw | xor | or | 1 | |
| CC10 | | | | sw | xor | | |

**3.** (각 5점)

**(1)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | add | | | | |
| CC2 | lw | add | | | |
| CC3 | sub | lw | add | | |
| CC4 | lw | sub | lw | add | |
| CC5 | lw | sub | (b) | lw | add |
| CC6 | lw | sub | (b) | (b) | lw |
| CC7 | xor | lw | sub | (b) | (b) |
| CC8 | and | xor | lw | sub | (b) |
| CC9 | sw | and | xor | lw | sub |
| CC10 | sw | and | (b) | xor | lw |

**(2)**

| | IF | ID | EX | MEM | WB | ForwardA | ForwardB |
|---|---|---|---|---|---|---|---|
| CC1 | add | | | | | | |
| CC2 | lw | add | | | | | |
| CC3 | sub | lw | add | | | | |
| CC4 | lw | sub | lw | add | | | |
| CC5 | lw | sub | (b) | lw | add | | |
| CC6 | xor | lw | sub | (b) | lw | 1 | |
| CC7 | and | xor | lw | sub | (b) | | |
| CC8 | sw | and | xor | lw | sub | | |
| CC9 | | sw | and | xor | lw | | 1 |
| CC10 | | | sw | and | xor | | |

## 4. (각 5점)

**(1)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | addi | | | | |
| CC2 | sub | addi | | | |
| CC3 | beq | sub | addi | | |
| CC4 | sll | beq | sub | addi | |
| CC5 | sw | sll | beq | sub | addi |
| CC6 | mul | sw | sll | beq | sub |
| CC7 | or | (b) | (b) | (b) | beq |
| CC8 | bne | or | (b) | (b) | (b) |
| CC9 | lw | bne | or | (b) | (b) |
| CC10 | add | lw | bne | or | (b) |
| CC11 | div | add | lw | bne | or |
| CC12 | addi | (b) | (b) | (b) | bne |
| CC13 | sub | addi | (b) | (b) | (b) |
| CC14 | beq | sub | addi | (b) | (b) |
| CC15 | sll | beq | sub | addi | (b) |
| CC16 | sw | sll | beq | sub | addi |
| CC17 | mul | sw | sll | beq | sub |
| CC18 | or | mul | sw | sll | beq |

**(2)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | addi | | | | |
| CC2 | sub | addi | | | |
| CC3 | beq | sub | addi | | |
| CC4 | sll | beq | sub | addi | |
| CC5 | or | (b) | beq | sub | addi |
| CC6 | bne | or | (b) | beq | sub |
| CC7 | lw | bne | or | (b) | beq |
| CC8 | addi | (b) | bne | or | (b) |
| CC9 | sub | addi | (b) | bne | or |
| CC10 | beq | sub | addi | (b) | bne |
| CC11 | sll | beq | sub | addi | (b) |
| CC12 | sw | sll | beq | sub | addi |
| CC13 | mul | sw | sll | beq | sub |
| CC14 | or | mul | sw | sll | beq |
| CC15 | bne | or | mul | sw | sll |
| CC16 | lw | bne | or | mul | sw |
| CC17 | addi | (b) | bne | or | mul |
| CC18 | sub | addi | (b) | bne | or |

**(3)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | addi | | | | |
| CC2 | sub | addi | | | |
| CC3 | beq | sub | addi | | |
| CC4 | or | beq | sub | addi | |
| CC5 | bne | or | beq | sub | addi |
| CC6 | addi | bne | or | beq | sub |
| CC7 | sub | addi | bne | or | beq |
| CC8 | beq | sub | addi | bne | or |
| CC9 | or | beq | sub | addi | bne |
| CC10 | bne | or | beq | sub | addi |
| CC11 | sll | (b) | (b) | beq | sub |
| CC12 | sw | sll | (b) | (b) | beq |
| CC13 | mul | sw | sll | (b) | (b) |
| CC14 | or | mul | sw | sll | (b) |
| CC15 | bne | or | mul | sw | sll |
| CC16 | addi | bne | or | mul | sw |
| CC17 | sub | addi | bne | or | mul |
| CC18 | beq | sub | addi | bne | or |

**(4)**

| | IF | ID | EX | MEM | WB |
|---|---|---|---|---|---|
| CC1 | addi | | | | |
| CC2 | sub | addi | | | |
| CC3 | beq | sub | addi | | |
| CC4 | sll | beq | sub | addi | |
| CC5 | or | sll | beq | sub | addi |
| CC6 | bne | or | sll | beq | sub |
| CC7 | lw | bne | or | sll | beq |
| CC8 | addi | lw | bne | or | sll |
| CC9 | sub | addi | lw | bne | or |
| CC10 | beq | sub | addi | lw | bne |
| CC11 | sll | beq | sub | addi | lw |
| CC12 | sw | sll | beq | sub | addi |
| CC13 | mul | sw | sll | beq | sub |
| CC14 | or | mul | sw | sll | beq |
| CC15 | bne | or | mul | sw | sll |
| CC16 | lw | bne | or | mul | sw |
| CC17 | addi | lw | bne | or | mul |
| CC18 | sub | addi | lw | bne | or |