

Classwork 07 CPE221 Computer Organization
Instructor: Rahul Bhadani
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Student's Name: _____

① Write equivalent ARM assembly program for the following:

```
if (a > b || b > c)
{
    d = 1;
}
else
{
    d = 0;
}
```

(10 points)

Solution:

```
LDR R0, =a
LDR R1, =b
LDR R2, =c
LDR R0, [R0]
LDR R1, [R1]
```

```

LDR R2, [R2]
CMP R0, R1      @ Compare a and b
BGT if_true     if a > b, go to if_true
CMP R1, R2      @ Compare b and c
BGT if_true     if b > c, go to if_true
MOV R3, #0      d = 0 (false condition)
B end
if_true:
    MOV R3, #1

end:
    LDR R4, =d @ load address of d into R4
    STR R3, [R4] @ store the result in d

a: .word 3
b: .word 4
c: .word 5
d: .word 0

```

②

Write an assembly program using ARM to compute a factorial of 5. (10 points)

Solution:

```

MOV R0, #5
MOV R1, #1 @ result initialization
MOV R2, #1 @ counter

```

for_loop:

CMP R2, R0 @ if $R2 == R0$

BGT end_for @ if $R2 > R0$, exit

MUL R1, R1, R2 @ $R1 = R1 * R2$

ADD R2, R2, #1 @ $R2++$

B for_loop @ Repeat

end_for:

done: B done

- ③ Write an ARM assembly program to add two numbers, only if the carry flag is clear (i.e. $C=0$). Then if the addition overflows, set $R3=1$. (5 points)

CMP R1, #0 @ just to ensure flags are set

ADDCC R4, R1, R2 @ $R4 = R1 + R2$

BVC NO_overflow @ Branch if no overflow

MOV R3, #1

NO_overflow:

done: B done