Tutorial 4
Program Control and Simple AL Programming

CO 2103 Assembly Language

Program Control - 1

- **Task 1:** Given that AX=1122h, BX=ddddh, CX=eeffh initially, determine for each of the following program segments (independently), whether L1 or L2 will be executed:

i.
```
xor ax,ax
jz L2
L1: ;instructions
jmp L3
L2: ;instructions
L3: ;ending
```

ii.
```
cmp ax,bx
jge L2
L1: ;instructions
jmp L3
L2: ;instructions
L3: ;ending
```

iii.
```
add ax,bx
cmp ax,cx
je L2
L1: ;instructions
jmp L3
L2: ;instructions
L3: ;ending
```

iv.
```
sub ax,bx
jns L2
L1: ;instructions
jmp L3
L2: ;instructions
L3: ;ending
```

Program Control - 2

- **Task 2:** Given that AX=3, BX=7, CX=8 initially, determine how many times will L1 be executed in the following program segments (independently):

i.
```
L1: dec ax
jnz L1
mov ax,3
dec bx
jnz L1
;ending
```

ii.
```
L1: dec bx
cmp bx,ax
jne L1
;ending
```

iii.
```
L1: dec ax
loop L1
;ending
```

iv.
```
L1: dec ax
loopnz L1
;ending
```

v.
```
L1: add ax,1
cmp ax,bx
loopne L1
;ending
```

Simple AL Programming

- **Task 3:** Write the AL program segment to perform each of the following simple mathematical expressions, in 16-bit, without error detection:
  - $a = x \times (y + z)$
  - $a = x^4$
  - $a = w - x \times y + z$

- **Task 4:** Write the AL program segment to perform each of the following simple IO operations:
  - print the string “working on tutorial 3” on the screen
  - read a character from the keyboard