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Computer Organization & Assembly Language
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Lab # 06 (Practicing with Branches to create different loops)

Objective:

To deal with creating loops in different types of problems with the help of branches in MIPS.

Example of Computing Factorial in MIPS:

```
.data
message:        .asciiz         "Enter a number to find factorial\n"
.text
.globl main
main:
        la      $a0 , message
        li      $v0 , 4
        syscall
        li      $v0 , 5
        syscall
        move    $t0 , $v0
        beq     $t0,0,base_case
        li      $t1 , 1
        move    $t2 , $t0
fact:
        mul     $t0 , $t0 , $t1
        add     $t1 , $t1 , 1
        blt     $t1 , $t2 , fact
        b       output
base_case:
        li      $t0, 1
output:
        move    $a0 , $t0
        li      $v0 , 1
        syscall

        li      $v0 , 10
        syscall
```

Example of Printing a Pattern Using Nested Loop:

```
.data

str1: .asciiz "*"
str2: .asciiz "\n"
.text
la $t0, str1
la $t1, str2
li $t2, 0
li $t3, 5

OuterLoop:
move $a0, $t1
li $v0,4
syscall
beq $t2,$t3,exit
add $t2, $t2, 1
li $t4, 1
b InnerLoop

InnerLoop:
bgt $t4, $t2, OuterLoop
move $a0,$t0
li $v0,4
syscall
add $t4, $t4,1
b InnerLoop


exit:
li $v0, 10
syscall
```

Printing Table from 1-5 using nested Loop:

```
.data
str:.asciiz "\n"
.text

li $t0, 1
li $t1, 6
li $t3, 1

b InnerLoop
OuterLoop:
li $t3,1
add $t0, $t0, 1
b InnerLoop

InnerLoop:
move $t2, $t0
beq $t0, $t1, exit
mul $t2,$t2,$t3
move $a0, $t2
li $v0, 1
syscall
la $a0, str
li $v0, 4
syscall
addi $t3, $t3, 1
ble $t3, 10, InnerLoop

ble $t0, 5, OuterLoop


exit:
li $v0, 10
syscall
```

Lab Task 06

(1) You are required to compute the same type of shape as seen below.

LAB ASSIGNMENT 06

(1) You are required to compute m^n where m and n are integers.

Sample input:

2

4

Sample output:

16

(2) Students are required to compute the sum of following series:

$$(n-1)^{n-1} + (n-2)^{n-2} + (n-3)^{n-3} + (n-4)^{n-4} + \ldots\ldots\ldots\ldots\ldots\ldots + (n-n)^{n-n}$$

You are required to take value of n as an input from the user. If n = 5 then sample input and sample output would be following:

Sample Input:

5

Sample Output:

289