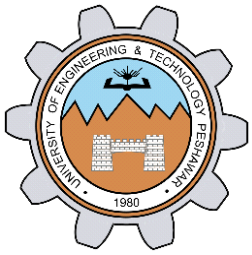
LAB# 5



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COA Lab

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"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

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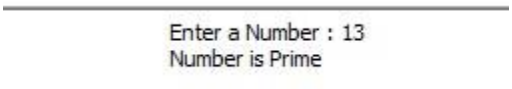
LAB 5 MIPS:

Q NO 1: Write a program to check whether a number input by user is prime or not.




```
.text
.globl main

main:
        li $v0, 4
        la $a0, num
        syscall

        li $v0, 5
        syscall
        move $t0, $v0

        li $t1, 2
        div $t4, $t0, $t1
again:
        div $t0, $t1
        mfhi $t3

        beq $t3, $zero, not_prime

        addi $t1, $t1, 1

        ble $t1, $t4, again

prime:
        li $v0, 4
        la $a0, Prime
        syscall
```

```
        beq $t3, $zero, not_prime

        addi $t1, $t1, 1

        ble $t1, $t4, again

prime:
        li $v0, 4
        la $a0, Prime
        syscall

        j exit

not_prime:
        li $v0, 4
        la $a0, new
        syscall

        j exit

exit:
        li $v0, 10
        syscall

.data
num: .asciiz"Enter a number if it is Prime or not: "
Prime: .asciiz"The given number is Prime. "
new: .asciiz"The given number is not_prime. "
```

Output:

```
Enter a number if it is Prime or not: 4
The given number is not_prime.
-- program is finished running --
```

Q NO 2: Repeat the above problem and display the largest two prime numbers lower than itself. Hint: If a user enters 20, then program displays 19 and 17.

Code:

.text

main:

li $v0, 4

la $a0, msg_input

syscall

li $v0, 5

syscall

```
sub $t0, $v0, 1
li $t1, 0

loop:
beq $t1, 2, end
move $a0, $t0
jal is_prime
beq $v0, 0, not_prime

li $v0, 4
la $a0, msg_prime
syscall
li $v0, 1
move $a0, $t0
syscall

addi $t1, $t1, 1

not_prime:
sub $t0, $t0, 1
j loop

end:
li $v0, 10
syscall
is_prime:
li $t2, 2
li $v0, 1
```

```
check:
bge $t2, $a0, ret
rem $t3, $a0, $t2
beq $t3, 0, fail
add $t2, $t2, 1
j check

fail:
li $v0, 0

ret:
jr   $ra
.data
msg_input:   .asciiz "Enter a number:\n "
msg_prime:   .asciiz "\nPrevious prime:\n "
```

Output:

```
Enter a number:
 4
```

```
Previous prime:
 3
Previous prime:
 2
```

Q NO 3: Write a program which takes two limits from user and display prime numbers between the two limits *(if user enter lower limit 10 and upper limit 30 then display prime numbers between 10 and 30).*

```
Enter the lower limit: 10
Enter the upper limit: 30
11 is Prime
13 is Prime
17 is Prime
19 is Prime
23 is Prime
29 is Prime
```

Code;

```
.data
msg1: .asciiz "Enter the lower number: "
msg2: .asciiz "Enter the upper number: "
msg3: .asciiz "Prime numbers between the given numbers: "
newline: .asciiz "\n"
.text
is_prime:
    li $v0, 1
    li $t0, 2

loop_check:
    beq $t0, $a0, exit
    div $a0, $t0
    mfhi $t1
    beqz $t1, not_prime

    addi $t0, $t0, 1
    j loop_check
not_prime:
    li $v0, 0
    j exit
```

```
main:
    li $v0, 4
    la $a0, msg1
    syscall

    li $v0, 5
    syscall
    move $s0, $v0

    li $v0, 4
    la $a0, msg2
    syscall

    li $v0, 5
    syscall
    move $s1, $v0

    # Print the message
    li $v0, 4
    la $a0, msg3
    syscall
```

```
    # Loop to find and display prime numbers
    loop:
        beq $s0, $s1, end
        move $a0, $s0
        jal is_prime
        beq $v0, 1, prime
        j lower_limit

        prime:
            # Print the prime number
            move $a0, $s0
            li $v0, 1
            syscall
            li $v0, 4
            la $a0, newline
            syscall

        lower_limit:
            addi $s0, $s0, 1
        j loop
```