CS 224
COMPUTER ORGANIZATION

PRELIMINARY DESIGN REPORT

LAB 03

BERK YILDIZ
21502040
SECTION 4

1.1) Recursive Division

```
.data
quotient: .asciiz "Quotient is "
remainder: .asciiz "Remainder is "
space: .asciiz "\n"
.text
     li $t0, 80 #divident at t0
     li $t1, 3 #divisor at t1
     jal division

     #quotient prompt
     la $a0, quotient
     li $v0, 4
     syscall
     move $a0, $t2
     li $v0, 1
     syscall

     la $a0, space
     li $v0, 4
     syscall

     #remainder prompt
     la $a0, remainder
     li $v0, 4
     syscall
```

```
    move $a0, $t0
    li $v0, 1
    syscall
    li $v0, 10
    syscall
division:
    li $t2, 0 # quotient at t2
substraction:
    ble $t0, 0, end
    sub $t0, $t0, $t1
    addi $t2, $t2, 1
    j substraction
end:
    beq $t0, 0, endMethod
    add $t0, $t0, $t1
    sub $t2, $t2, 1
endMethod:
    jr $ra
```

1.2) Sum of Digits

```
.text
li $t0, 345 #integer to compute
li $t1, 10
li $t3, 0 #sum of digits
sum:
    div $t0,$t1
    mflo $t0
```

```
     mfhi $t2

     add $t3,$t3,$t2

     beq $t0,$0, end

     j sum

end:

move $a0, $t3

li $v0, 1

syscall


li $v0,10

syscall
```

1.3) Delete

```
     Delete_n:
          add $t0, $0, $a0 #pointer
          add $t1, $0, $a1 #value

          bne $t1, 1, notHead #Delete first one so head

          lw $t7, 0($t0)
          add $v1, $0, $t7
          addi $v0, $0, 0
          j doneDelete

     notHead :
          add $t6, $t0, $0 #pointer head
          addi $t2, $0, 2 #counter

     goNthItem :
          beq $t2, $t1, doneGoNthItem
          beq $t6, $0, failGoNthItem # If next is null before

          lw $t7, 0($t6) # next of current node
          add $t6, $0, $t7
          addi $t2, $t2, 1

          j goNthItem
```

```
doneGoNthItem :
     lw $t7, 0($t6)
     lw $t5, 0($t7)
     sw $t5, 0($t6)
     add $v1, $0, $t0
     addi $v0, $0, 0
     j doneDeleteN

failGoNthItem :
     addi $v0, $0, -1
     add $v1, $0, $t0
     doneDeleteN :
     jr $ra
```

1.4) Floating Point Numbers

a) Single precision:

|-100.25| = 100.25

100(10) = 110 0100(2)

0.25(10) = 0.01(2)

100.25(10) = 110 0100.01(2)

100.25(10) = 110 0100.01(2) = 110 0100.01(2) × 2^0
= 1.1001 0001(2) × 2^6

Mantissa = 1. 1001 0001 000 0000 0000 0000
= 100 1000 1000 0000 0000 0000

Sign = 1
Exponent = 1000 0101
Mantissa = 100 1000 1000 0000 0000 0000

Result: 1100 0010 1100 1000 1000 0000 0000 0000

Double precision:

|-100.25| = 100.25

100(10) = 110 0100(2)

0.25(10) = 0.01(2)

100.25(10) = 110 0100.01(2)
100.25(10) =

```
110 0100.01(2) = 110 0100.01(2) × 20
= 1.1001 0001(2) × 26

Mantissa = 1. 1001 0001 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000
= 1001 0001 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000

Sign = 1
Exponent = 100 0000 0101
Mantissa = 1001 0001 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000

Result: 1100 0000 0101 1001 0001 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000
```