**CS 224**

**COMPUTER ORGANIZATION**

**PRELIMINARY DESIGN REPORT**

**LAB 03**

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**SECTION 4**

* 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. **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. **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. **Floating Point Numbers**

1. **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