

Lab Sheet 3


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ASWIN G MENON

AM.EN.U4CSE20313

1. Write a program in MIPS assembly language that computes the area of a rectangle given the width and the height. The width and height are read from the standard input after prompting the user, and then the program computes the area and prints it on the standard output.

```
rectangle.s
1  .data
2  MSG1: .asciiz "Enter Height: "
3  MSG2: .asciiz "Enter Width: "
4  MSG3: .asciiz "Area: "
5
6  .text
7
8  main:
9  li $v0, 4
10 la $a0, MSG1
11 syscall
12 li $v0, 5
13 syscall
14 move $t3,$v0
15 li $v0, 4
16 la $a0, MSG2
17 syscall
18 li $v0, 5
19 syscall
20 move $t2,$v0
21 mul $t1,$t3,$t2
22 li $v0, 4
23 la $a0,MSG3
24 syscall
25 li $v0,1
26 move $a0,$t1
27 syscall
28 jr $ra
29
```

 Console

Enter Height: 5
Enter Width: 6
Area: 30

2. Write a program in MIPS assembly language to swap two values. Get input from the user and display the values on screen after swap operation.

```

1  .data
2  MSG1: .ascii "Enter First Number: "
3  MSG2: .ascii "Enter Second Number: "
4  MSG3: .ascii "After Swapping "
5  MSG4: .ascii "\nFirst Number: "
6  MSG5: .ascii "\nSecond Number: "
7  .text
8
9
10 main:
11  li $v0, 4
12  la $a0, MSG1
13  syscall
14  li $v0, 5
15  syscall
16  move $t3,$v0
17  li $v0, 4
18  la $a0, MSG2
19  syscall
20  li $v0, 5
21  syscall
22  move $t2,$v0
23  move $t5,$t3
24  move $t3,$t2
25  move $t2,$t5
26  li $v0, 4
27  la $a0, MSG3
28  syscall
29  li $v0, 4
30  la $a0, MSG4
31  syscall
32  li $v0,1
33  move $a0,$t3
34  syscall
35  li $v0,4
36  la $a0,MSG5
37  syscall
38  li $v0,1
39  move $a0,$t2
40  syscall
41  jr $ra

```

Console

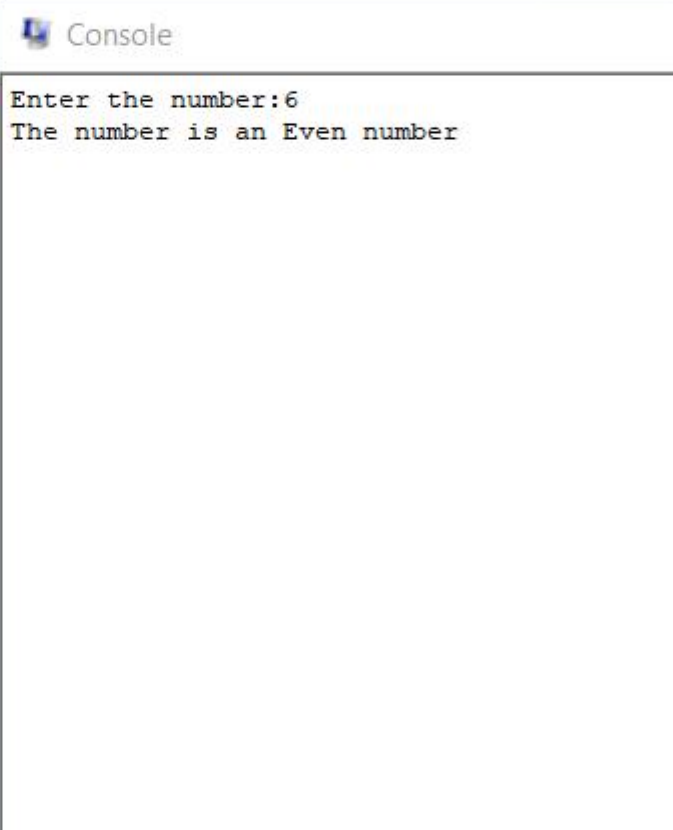
```

Enter First Number: 4
Enter Second Number: 5
After Swapping
First Number: 5
Second Number: 4|

```

3. Write a program to check an entered number is odd or even.

```
1  #Program to check whether a number is odd or even
2  .data
3  Msg1: .ascii "Enter the number:"
4  Msg2: .ascii "The number is an Even number"
5  Msg3: .ascii "The number is an Odd number"
6
7
8  .text
9  main:
10  li $t0,0
11  li $v0,4
12  la $a0,Msg1
13  syscall
14  li $v0,5
15  syscall
16  move $t2,$v0
17  andi $t2,$t2,1
18  beq $t2,$t0,Even
19  li $v0,4
20  la $a0,Msg3
21  syscall
22  j Exit
23  Even:
24  li $v0,4
25  la $a0,Msg2
26  syscall
27  j Exit
28  Exit:
29  jr $ra
```



Console

Enter the number:6
The number is an Even number

4. Write programs to evaluate the following expressions. The user should enter the variables, and the program should print back an answer. Prompt the user for all variables in the expression, and print the results in a meaningful manner. The results should be as accurate as possible.

i. $4x^2 + 2x + 3$.

```

.data
prompt: .asciiz "Enter a value for x: "
result: .asciiz "The result is: "

.text
.globl main
main:
# Get input value, x
addi $v0, $zero, 4
la $a0, prompt
syscall
addi $v0, $zero, 5
syscall
move $s0, $v0
mul $t0, $s0, $s0
mul $t0, $t0, 4
mul $t1, $s0, 2
add $t0, $t0, $t1
addi $s1, $t0, 3
addi $v0, $zero, 4 # Print result string
la $a0, result
syscall
addi $v0, $zero, 1 # Print result
move $a0, $s1
syscall
addi $v0, $zero, 10
syscall

```

Console


```

Enter a value for x: 5
The result is: 113

```

ii. $5x + 3y + z$

```
1  .data
2  prompt: .ascii "Enter a value for x: "
3  prompt1: .ascii "Enter a value for y: "
4  prompt2: .ascii "Enter a value for z: "
5  result: .ascii "The result is: "
6  .text
7  .globl main
8  main:
9  addi $v0, $zero, 4
10 la $a0, prompt
11 syscall
12 addi $v0, $zero, 5
13 syscall
14 move $s0, $v0
15 addi $v0, $zero, 4
16 la $a0, prompt1
17 syscall
18 addi $v0, $zero, 5
19 syscall
20 move $s7, $v0
21 addi $v0, $zero, 4
22 la $a0, prompt2
23 syscall
24 addi $v0, $zero, 5
25 syscall
26 move $s6, $v0
27 mul $t0, $s0, 5
28 mul $t1, $s7, 3
29 add $t0, $t0, $t1
30 add $s1, $t0, $s6
31 addi $v0, $zero, 4
32 la $a0, result
33 syscall
34 addi $v0, $zero, 1
35 move $a0, $s1
36 syscall
```

 Console

```
Enter a value for x: 3
Enter a value for y: 5
Enter a value for z: 1
The result is: 31
```

iii. $((5x + 3y + z) / 2) * 3$

```

4cs
1  .data
2  prompt: .asciiz "Enter a value for x: "
3  prompt1: .asciiz "Enter a value for y: "
4  prompt2: .asciiz "Enter a value for z: "
5  result: .asciiz "The result is: "
6  .text
7  .globl main
8  main:
9  # Get input value, x
10 addi $v0, $zero, 4
11 la $a0, prompt
12 syscall
13 addi $v0, $zero, 5
14 syscall
15 move $s0, $v0
16 # Get input value, y
17 addi $v0, $zero, 4
18 la $a0, prompt1
19 syscall
20 addi $v0, $zero, 5
21 syscall
22 move $s7, $v0
23 # Get input value, z
24 addi $v0, $zero, 4
25 la $a0, prompt2
26 syscall
27 addi $v0, $zero, 5
28 syscall
29 move $s6, $v0
30 # Calculate the result of 5x+3y+z and store it
31 mul $t0, $s0, 5
32 mul $t1, $s7, 3
33 add $t0, $t0, $t1
34 add $s1, $t0, $s6
35 div $s1, $s1, 2
36 mul $s1, $s1, 3
37 # Print output
38 addi $v0, $zero, 4 # Print result string
39 la $a0, result
40 syscall
41 addi $v0, $zero, 1 # Print result
42 move $a0, $s1
43 syscall
44 #Exit program
45 addi $v0, $zero, 10
46 syscall

```

Console

```

Enter a value for x: 5
Enter a value for y: 23
Enter a value for z: 1
The result is: 141

```

iv. $(4x / 3) * y$

```

#Program to evaluate ((4x/3)*y)
.data
Msg1: .asciiz "Enter the coeffecient of x: "
Msg2: .asciiz "Enter the coeffecient of y: "
Msg3: .asciiz "Result: "
.text
main:
li $t4,4
li $t5,3
li $v0,4
la $a0,Msg1
syscall
li $v0,5
syscall
move $t0,$v0 #x
li $v0,4
la $a0,Msg2
syscall
li $v0,5
syscall
move $t1,$v0 #y
mul $t3,$t0,$t4
div $t3,$t3,$t5
mul $t3,$t3,$t1
li $v0,4
la $a0,Msg3
syscall
li $v0,1
move $a0,$t3
syscall
jr $ra

```

Console

```

Enter the coeffecient of x: 6
Enter the coeffecient of y: 4
Result: 32

```
