CMSC216 Week14Lab2 (Lab Work)

Last Name:

First Name:

Numeric University ID:

Complete the following task and submit your work to GradeScope

A. Make the Fibonacci function work, by filling in the instructions on the lines underlined in the following code. The instructions must achieve the work explained in the comments given on individual lines.

Write your answer directly on the PDF file (using pdf edit software) or on a physical copy after printing the PDF to avoid penalty.

```
fibonacci:

    # PROLOGUE

    subu $sp, $sp, 8        # expand stack by 8 bytes

Q1  sw $ra, 8($sp)          # save return address

Q2  sw $fp, 4($sp)          # save the frame pointer register value of the caller

    addu $fp, $sp, 8        # set $fp to saved $ra


    # BODY

    beq  $a0, 1, fibonacci_ret1  # if n == 1 goto ret1

    beq  $a0, 0, fibonacci_ret0  # if n == 0 goto ret0


    # n > 1: save s0, s1 on stack before using them

Q3  subu $sp, $sp, 8        # grow stack by 8 bytes (i.e., 2 ints)

Q4  sw $s0, 8($sp)          # save $s0 (in 4 bytes (out of 8 reserved) at higher address)

Q5  sw $s1, 4($sp)          # save $s1 (in the other 4 bytes)

    subu $a0, $a0, 1        # n-1

    move $s0, $a0           # use s0 to save n-1

    jal  fibonacci          # v0 = fibonacci(n-1)

    move $s1, $v0           # use s1 to save fibonacci(n-1)
```

```
    subu $a0, $s0, 1        # n-2
```

Q6 jal fibonacci # call Fibonacci (recursive call). After return, v0 will have the value of fibonacci(n-2)

```
    addu $v0, $v0, $s1      # v0 = fibonacci(n-2) + fibonacci(n-1)
```

Q7 lw $s0, -8($fp) # restore s0 (use offset from $fp)

Q8 lw $s1, -12($fp) # restore s1 (use offset from $fp)

```
    b    fibonacci_return
```

```
fibonacci_ret1:
    li   $v0, 1             # rval = 1
    b    fibonacci_return
fibonacci_ret0:
    li   $v0, 0             # rval = 0
fibonacci_return:
```

 # EPILOGUE

Q9 move $sp,$fp # restore $sp

```
    lw   $ra, ($fp)         # restore saved $ra
```

Q10 lw $fp, -4($fp) # restore saved $fp

```
    j    $ra                # return
```