Question 5 (20 points): Write RISC-V assembly for the function reverseString that reverses the order of characters in a null terminated string. For example, reverseString changes the string RISC into the string CSIR or the string ISA into the string ASI. The resulting string is also null terminated. These are only examples, reverseString must work for strings with any number of characters, including an empty string. The parameters for reverseString are as follows:

- a0: the address of the first character of a null-terminates string.
- a1: the number of characters in the string.

reverseString has no return value.

The assembly code that you write must follow all the register saving/restoring conventions for RISC-V.

```
39 # reverseString
40 # a0: address of first character of string
41 # a1: non-negative length of string (does not include NULL character)
42 # peudo code:
  # for(i=0, j=length-1; i != j; i++. j--)
        temp <- S[i]
45 #
        S[i] \leftarrow S[j]
  #
        S[j] \leftarrow temp
46
   reverseString:
47
48
       beg a1, zero, doneString # if string is empty, done
            t0, zero
                            # i <- 0
49
       addi t1, a1, −1
                            # j <- length-1
50
       bge t0, t1, doneString # if i>=j, done
51
  nextswap:
52
       add t2, a0, t0
53
                            # t1 <- address{S[i]}</pre>
       add
            t3, a0, t1
                            # t2 <- address{S[j]}
54
       1bu
            t4, 0(t2)
                            # t4 <- S[i]
            t5, 0(t3)
                            # t5 <- S[j]
       1bu
56
       sb
            t4, 0(t3)
                            # S[j] <- S[i]
57
                            # S[i] <- S[j]
            t5, 0(t2)
       sb
59
       addi t0, t0, 1
                            # i <- i+1
       addi t1, t1, -1
                            # j <- j-1
60
       blt t0, t1, nextswap # if i<j goto nextswap
61
   doneString:
   jalr
           zero, ra, 0
```

Figure 1: A solution for reverseString.