Problem 2.47

To test for loop termination, the constant 401 is needed. Assume that it is placed in memory when the program is loaded:

```
lw $t8, AddressConstant401($zero)  # $t8 = 401
lw $t7, 4($a0)  # $t7 = length of a[]
lw $t6, 4($a1)  # $t6 = length of b[]
add $t0, $zero, $zero  # initialize i = 0
Loop:  slt $t4, $t0, $zero  # $t4 = 1 if i < 0
       bne $t4, $zero, IndexOutOfBounds  # if i < 0, goto Error
       slt $t4, $t0, $t6  # $t4 = 0 if i >= length b
       beq $t4, $zero, IndexOutOfBounds  # if i >= length, goto Error
       slt $t4, $t0, $t7  # $t4 = 0 if i >= length a
       beq $t4, $zero, IndexOutOfBounds  # if i >= length, goto Error
       add $t1, $a1, $t0  # $t1 = address of b[i]
lw $t2, 8($t1)  # $t2 = b[i]
add $t2, $t2, $s0  # $t2 = b[i] + c
add $t3, $a0, $t0  # $t3 = address of a[i]
sw $t2, 8($t3)  # a[i] = b[i] + c
addi $t0, $t0, 4  # i = i + 4
slt $t4, $t0, $t8  # $t8 = 1 if $t0 < 401, i.e., i <= 100
bne $t4, $zero, Loop  # goto Loop if i <= 100
```

The number of instructions executed is $4 + 101 \times 14 = 1418$. The number of data references made is $3 + 101 \times 2 = 205$