Quiz 6: May 8, 2014

1. (6 points) The following LC-3 program compares two character strings of the same length. The source strings are in the .STRINGZ form (one ASCII character per 16-bit word). The first string starts at memory location x4000, and the second string starts at memory location x4100. If the strings are the same, the program terminates with the value 0 in R5. Insert instructions at (a), (b), and (c) that will complete the program.

```
.ORIG x3000
LD R1, FIRST
LD R2, SECOND
AND R0, R0, #0

LOOP
  LDR R4, R2, #0
  BRz NEXT
  ADD R1, R1, #1
  ADD R2, R2, #1

  ADD R3, R3, R4
  BRz LOOP
  AND R5, R5, #0
  BRnzp DONE

NEXT
  AND R5, R5, #0
  ADD R5, R5, #1

DONE
  HALT
  FIRST .FILL x4000
  SECOND .FILL X4100
  .END
```

(a) LDR R3, R1, #0
(b) NOT R4, R4
(c) ADD R4, R4, 1

2. (4 points) We want the following program fragment to shift R3 to the left by four bits, but it has an error in it. Identify the error and explain how to fix it.

```
.ORIG x3000
AND R2, R2, #0
ADD R2, R2, #4

LOOP
  BRz DONE
  ADD R2, R2, #4
  ADD R3, R3, R3
  OR ADD R3, R3, R3
  ADD R2, R2, #4
  BRz DONE

DONE
  HALT
  .END
```

Two conditions are needed:

1) Shifting R3 must happen before checking if loop is done.
2) Decrement counter (R2) before BRz.