

# Homework06

1. The following program is supposed to print the number 5 on the screen. It does not work. Why? Answer in no more than ten words, please.

```
1      .ORIG  x3000
2      JSR    A
3      OUT                    ;TRAP x21
4      BRnzp  DONE
5  A     AND    R0,R0,#0
6      ADD    R0,R0,#5
7      JSR    B
8      RET
9  DONE  HALT
10  ASCII  .FILL  x0030
11  B     LD     R1,ASCII
12      ADD    R0,R0,R1
13      RET
14      .END
```

2.The following LC-3 program is assembled and then executed. There are no assemble time or run-time errors. What is the output of this program? Assume all registers are initialized to 0 before the program executes.

```
1      .ORIG x3000
2      ST R0, #6 ; x3007
3      LEA R0, LABEL
4      TRAP x22
5      TRAP x25
6  LABEL .STRINGZ "FUNKY"
7  LABEL2 .STRINGZ "HELLO WORLD"
8      .END
```

3.The following nonsense program is assembled and executed.

```

1      .ORIG x4000
2      LD R2,BOBO
3      LD R3,SAM
4  AGAIN  ADD R3,R3,R2
5          ADD R2,R2,#-1
6          BRnzp SAM
7  BOBO   .STRINGZ "Why are you asking me this?"
8  SAM    BRnp AGAIN
9          TRAP x25
10         .BLKW 5
11  JOE    .FILL x7777
12         .END

```

How many times is the loop executed? When the program halts, what is the value in R3? (If you do not want to do the arithmetic, it is okay to answer this with a mathematical expression.)

4. The program below, when complete, should print the following to the monitor:

**ABCFGH**

Insert instructions at (a)–(d) that will complete the program.

```

1      .ORIG x3000
2      LEA R1, TESTOUT
3  BACK_1 LDR R0, R1, #0
4          BRz NEXT_1
5          TRAP x21
6          ----- (a)
7          BRnzp BACK_1
8          ;
9  NEXT_1 LEA R1, TESTOUT
10 BACK_2 LDR R0, R1, #0
11          BRz NEXT_2
12          JSR SUB_1
13          ADD R1, R1, #1
14          BRnzp BACK_2
15          ;
16 NEXT_2 ----- (b)
17          ;
18 SUB_1  ----- (c)
19 K      LDI R2, DSR
20          ----- (d)
21          STI R0, DDR
22          RET
23 DSR    .FILL xFE04
24 DDR    .FILL xFE06

```

```

25 TESTOUT .STRINGZ "ABC"
26         .END

```

5.Shown below is a partially constructed program. The program asks the user his/her name and stores the sentence "Hello, name" as a string starting from the memory location indicated by the symbol HELLO. The program then outputs that sentence to the screen. The program assumes that the user has finished entering his/her name when he/she presses the Enter key, whose ASCII code is x0A. The name is restricted to be not more than 25 characters.

Assuming that the user enters Onur followed by a carriage return when prompted to enter his/her name, the output of the program looks exactly like:

Please enter your name: Onur

Hello, Onur

Insert instructions at (a)–(d) that will complete the program.

```

1      .ORIG x3000
2      LEA  R1,HELLO
3  AGAIN  LDR  R2,R1,#0
4          BRz  NEXT
5          ADD  R1,R1,#1
6          BR   AGAIN
7  NEXT   LEA  R0,PROMPT
8          TRAP x22          ; PUTS
9          ----- (a)
10  AGAIN2 TRAP x20          ; GETC
11          TRAP x21          ; OUT
12          ADD  R2,R0,R3
13          BRz  CONT
14          ----- (b)
15          ----- (c)
16          BR   AGAIN2
17  CONT   AND  R2,R2,#0
18          ----- (d)
19          LEA  R0, HELLO
20          TRAP x22          ; PUTS
21          TRAP x25          ; HALT
22  NEGENTER .FILL xFFF6      ; -x0A
23  PROMPT  .STRINGZ "Please enter your name: "
24  HELLO    .STRINGZ "Hello, "
25          .BLKW #25
26          .END

```