

1. 6.16 An LC-3 program is located in memory locations x3000 to x3006. It starts executing at x3000. If we keep track of all values loaded into the MAR as the program executes, we will get a sequence that starts as follows. Such a sequence of values is referred to as a trace.

We have shown below some of the bits stored in locations x3000 to x3006. Your job is to fill in each blank space with a 0 or a 1, as appropriate.

MAR Trace

x3000

x3005

x3001

x3002

x3006

x4001

x3003

x0021

x3000	0	0	1	0	0	0	0									
x3001	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
x3002	1	0	1	1	0	0	0									
x3003																
x3004	1	1	1	1	0	0	0	0	0	0	1	0	0	1	0	1
x3005	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
x3006																

简答题 (4 分) 4 分

```

x3000 0010 000 0 0000 0100
x3002 0001 0000 0010 0001
x3002 1011 000 0 0000 0011
x3003 1111 0000 0010 0001
x3004 1111 0000 0010 0101
x3005 0000 0000 0011 0000
x3006 0100 0000 0000 0001


```

2. 7.4 Create the symbol table entries generated by the assembler when translating the following routine into machine code:

```
1  .ORIG    x301C
2      ST   R3, SAVE3
3      ST   R2, SAVE2
4      AND  R2, R2, #0
5      TEST  IN
6      BRz  TEST
7      ADD  R1, R0, #-10
8      BRn  FINISH
9      ADD  R1, R0, #-15
10     NOT  R1, R1
11     BRn  FINISH
12     HALT
13     FINISH  ADD  R2, R2, #1
14     HALT
15     SAVE3   .FILL  x0000
16     SAVE2   .FILL  x0000
17     .END
```

简答题 (2 分) 2 分

附件名
大小

 7y.4.jpg



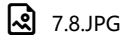
3. 7.8 An engineer is in the process of debugging a program she has written. She is looking at the following segment of the program and decides to place a breakpoint in memory at location 0xA404. Starting with the PC = 0xA400, she initializes all the registers to zero and runs the program until the breakpoint is encountered.

Show the contents of the register file (in hexadecimal) when the breakpoint is encountered.

```
1  xA400  THIS1  LEA R0, THIS1
2  xA401  THIS2  LD  R1, THIS2
3  xA402  THIS3  LDI R2, THIS5
4  xA403  THIS4  LDR R3, R0, #2
5  xA404  THIS5  .FILL  xA400
6
```

简答题 (4 分) 4 分

show in figure



7.8.JPG



4. 7.10 The following program fragment has an error in it. Identify the error and explain how to fix it.

Will this error be detected when this code is assembled or when this code is run on the LC-3?

```
1      ADD R3, R3, #30
2      ST  R3, A
3      HALT
4      A   .FILL #0
```

简答题 (2 分) 2 分

the instruction "ADD R3, R3, #30" contains an immediate value that is too large to be stored. the instruction can't be translated and run ,thus the error will be detected ,and not run.

5. 7.18 The following LC-3 program compares two character strings of the same length. The source strings are in the .STRINGZ form. 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 1 in R5. Insert instructions at (a), (b), and (c) that will complete the program.

```
1      .ORIG x3000
2      LD  R1, FIRST
3      LD  R2, SECOND
4      AND R0, R0, #0
5      LOOP ----- (a)
6      LDR R4, R2, #0
7      BRz NEXT
8      ADD R1, R1, #1
9      ADD R2, R2, #1
10     ----- (b)
11     ----- (c)
12     ADD R3, R3, R4
13     BRz LOOP
14     AND R5, R5, #0
15     BRnzp DONE
16     NEXT AND R5, R5, #0
17     ADD R5, R5, #1
18     DONE TRAP x25
19     FIRST .FILL x4000
20     SECOND .FILL x4100
21     .END
22
```

简答题 (3 分) 3 分

a: LDR R3,R1,#0
b: NOT R3,R3
c: ADD R3,R3,#1

6. 7.23 The following LC-3 program determines whether a character string is a palindrome or not. A palindrome is a string that reads the same backwards as forwards. For example, the string “racecar” is a palindrome. Suppose a string starts at memory location x4000 and is in the .STRINGZ format. If the string is a palindrome, the program terminates with the value 1 in R5. If not, the program terminates with the value 0 in R5. Insert instructions at (a)–(e) that will complete the program.

```
1  .ORIG  x3000
2  LD  R0, PTR
3  ADD R1, R0, #0
4  AGAIN LDR R2, R1, #0
5  BRz  CONT
6  ADD R1, R1, #1
7  BRnzp AGAIN
8  CONT  ----- (a)
9  LOOP  LDR R3, R0, #0
10 ----- (b)
11 NOT  R4, R4
12 ADD  R4, R4, #1
13 ADD  R3, R3, R4
14 BRnp  NO
15 ----- (c)
16 ----- (d)
17 NOT  R2, R0
18 ADD  R2, R2, #1
19 ADD  R2, R1, R2
20 BRnz  YES
21 ----- (e)
22 YES  AND R5, R5, #0
23 ADD  R5, R5, #1
24 BRnzp DONE
25 NO   AND R5, R5, #0
```

简答题 (5 分) 5 分

- A. ADD R1,R1,#-1
- B. LDR R4,R1,#0
- C. ADD R0,R0,#1
- D. ADD R1,R1.#-1
- E. BR LOOP