.orig x3000

LD R1, A

LD R2, B

LDI R3, C

LDI R4, D

ADD R0, R1, R2

ADD R0, R0, #-1

OUT

HALT

A .fill 25

X .blkw 5

Y .STRINGZ "Hi"

B .fill 26

C .fill x3008

D .fill xFE04

.end

1. What is the address of A?
2. What is the address of X?
3. What is the address of Y?
4. What is the address of B?
5. What does the program print?
6. How would you print the string stored at Y?
7. Write LC3 code for the following:

if (R0 > R1 && R0 > R2) Print R0;

else Print R1

1. Why does the LC3 need tristate buffers?
2. Which lines on the numbered LC3 diagram get used for the execution phase of the LEA instruction?
3. Which instructions put a 1 on LD.CC?
4. Which lines on the memory portion of the numbered LC3 diagram get used for LD R1, A on the program above?
5. Which lines on the memory portion of the numbered LC3 diagram get used for LD R1, C on the program above?

|  |  |
| --- | --- |
| ASCII | |
| Punctuation | '<SPACE> '=32, '!'=33, '<DOUBLE\_QUOTE>'=34, '#'=35, '$'=36, '%'=37, '&'=38, '<SINGLE\_QUOTE>'=39, '('=40, ')'=41, '\*'=42, '+'=43, "', '=44", '-'=45, '.'=46, '/'=47 |
| Numbers | '0'=48, '1'=49, '2'=50, '3'=51, '4'=52, '5'=53, '6'=54, '7'=55, '8'=56, '9'=57 |
| Capital Letters | 'A'=65, 'B'=66, 'C'=67, 'D'=68, 'E'=69, 'F'=70, 'G'=71, 'H'=72, 'I'=73, 'J'=74, 'K'=75, 'L'=76, 'M'=77, 'N'=78, 'O'=79, 'P'=80, 'Q'=81, 'R'=82, 'S'=83, 'T'=84, 'U'=85, 'V'=86, 'W'=87, 'X'=88, 'Y'=89, 'Z'=90 |
| More Punctuation | ':'=58, ';'=59, '<'=60, '='=61, '>'=62, '?'=63, '@'=64 |
| Lower Case Letters | 'a'=97, 'b'=98, 'c'=99, 'd'=100, 'e'=101, 'f'=102, 'g'=103, 'h'=104, 'i'=105, 'j'=106,  'k'=107, 'l'=108, 'm'=109, 'n'=110, 'o'=111, 'p'=112, 'q'=113, 'r'=114, 's'=115,  't'=116, 'u'=117, 'v'=118, 'w'=119, 'x'=120, 'y'=121, 'z'=122 |
| More Punctuation | '{'=123, '|'=124, '}'=125, '~'=126 |

**KEY BELOW**

.orig x3000

LD R1, A

LD R2, B

LDI R3, C

LDI R4, D

ADD R0, R1, R2

ADD R0, R0, #-1

OUT

HALT

A .fill 25

X .blkw 5

Y .STRINGZ "Hi"

B .fill 26

C .fill x3008

D .fill xFE04

.end

1. What is the address of A? x3008
2. What is the address of X? x3009
3. What is the address of Y? x300E
4. What is the address of B? x3011
5. What does the program print? 25 + 26 – 1 = 50 ASCII char for 50 is 2
6. How would you print the string stored at Y?

LEA R0, Y

PUTS

1. Write LC3 code for the following:

if (R0 > R1 && R0 > R2) Print R0;

else Print R1

1. Why does the LC3 need tristate buffers?

Bus access by multiple registers requires only one register connected at a time.

1. Which lines on the numbered LC3 diagram get used for the execution phase of the LEA instruction?

12, 6, 2

1. Which instructions put a 1 on LD.CC?

All with + on the LC3 Instruction format sheet.

1. Which lines on the memory portion of the numbered LC3 diagram get used for LD R3, C on the program above?

21 and 19

1. Which lines on the memory portion of the numbered LC3 diagram get used for LD R4, D on the program above?

28 and 19

|  |  |
| --- | --- |
| ASCII | |
| Punctuation | '<SPACE> '=32, '!'=33, '<DOUBLE\_QUOTE>'=34, '#'=35, '$'=36, '%'=37, '&'=38, '<SINGLE\_QUOTE>'=39, '('=40, ')'=41, '\*'=42, '+'=43, "', '=44", '-'=45, '.'=46, '/'=47 |
| Numbers | '0'=48, '1'=49, '2'=50, '3'=51, '4'=52, '5'=53, '6'=54, '7'=55, '8'=56, '9'=57 |
| Capital Letters | 'A'=65, 'B'=66, 'C'=67, 'D'=68, 'E'=69, 'F'=70, 'G'=71, 'H'=72, 'I'=73, 'J'=74, 'K'=75, 'L'=76, 'M'=77, 'N'=78, 'O'=79, 'P'=80, 'Q'=81, 'R'=82, 'S'=83, 'T'=84, 'U'=85, 'V'=86, 'W'=87, 'X'=88, 'Y'=89, 'Z'=90 |
| More Punctuation | ':'=58, ';'=59, '<'=60, '='=61, '>'=62, '?'=63, '@'=64 |
| Lower Case Letters | 'a'=97, 'b'=98, 'c'=99, 'd'=100, 'e'=101, 'f'=102, 'g'=103, 'h'=104, 'i'=105, 'j'=106,  'k'=107, 'l'=108, 'm'=109, 'n'=110, 'o'=111, 'p'=112, 'q'=113, 'r'=114, 's'=115,  't'=116, 'u'=117, 'v'=118, 'w'=119, 'x'=120, 'y'=121, 'z'=122 |
| More Punctuation | '{'=123, '|'=124, '}'=125, '~'=126 |