ICS Homework 6

崔士强 PB22151743

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A1

1. 65 times.
2. $x0BFB + \sum_{i=x0001}^{x0041} i$

A2

1. Using RET would result in the program returning to whatever address is in R7, which might not be the correct return address from the interrupt.
2. If RET is used instead of RTI, PSR is not correctly restored.

A3

1. The character whose ASCII value is x0049(i.e. I).
2. No. Value in R7 is lost after the instruction `JSR B`, which means subroutine A cannot return as expected.

A4

X is ACV(Access Control Violation) exception.

X is set to 1 when the value stored in MAR is greater than xFE00 or less than x3000 and PSR[15] = 1.

A5

1. Read KBSR. If the first bit of KBSR is 0(i.e. value in KBSR is not negative), there is a new character input from the keyboard.
2. The character is stored in KBDR. So read the KBDR.
3. Keep checking the DSR until the value is not negative, then store the character in DDR.

4.

```
START  LDI    R1, KBSR   ; Test for character input
       BRzp   START
       LDI    R0, KBDR
ECHO   LDI    R1, DSR    ; Test for display
       BRzp   ECHO
       STI    R0, DDR
       BRnzp  CONTINUE
KBSR   .FILL  xFE00      ; Address of KBSR
KBDR   .FILL  xFE02      ; Address of KBDR
DSR    .FILL  xFE04      ; Address of DSR
DDR    .FILL  xFE06      ; Address of DDR
```

A6

1.

```
  BRzp   WAIT
  BRzp   LETTER
  BR     CONTINUE
  BRp    GETCHAR
  C1     .FILL    #-65
  C2     .FILL    #17
```

2. Left shift `R0` by 4 bits.

3. No. The content of `R0` has already been wiped out.

A7

1. `H3ll0_W0r1d`

2. 34.

A8

1. A character may be read more than once.

2.

3. The first one. It's almost certain that the user cannot strike the keyboard in sync with the processor.

A9

`F !`

A10