國立成功大學

113學年度碩士班招生考試試題

編　號：120

系　所：工程科學系

科　目：計算機概論

日　期：0202

節　次：第 2 節

備　註：不可使用計算機

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※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

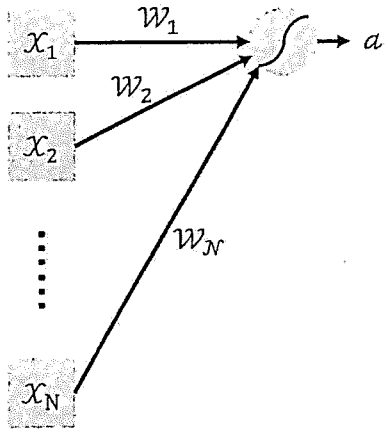
1. The following is the recursive syntax of Hanoi Tower. Please change the following recursive method to a non-recursive one. （15%）

```
Hanoi Tower (N,A,B,C)
do
    If  N > 0
    then do
        Hanoi Tower(N-1,A,C,B)
        Move the Nth tray, from A to B
        Hanoi Tower(N-1,C,B,A)
    Finish
 Finish
```

Parameters: N means the number of plates to be moved, A means the starting point, B means the end point, C means the emp point. In the other words, N plates will be moved from A to B with the temp point C.

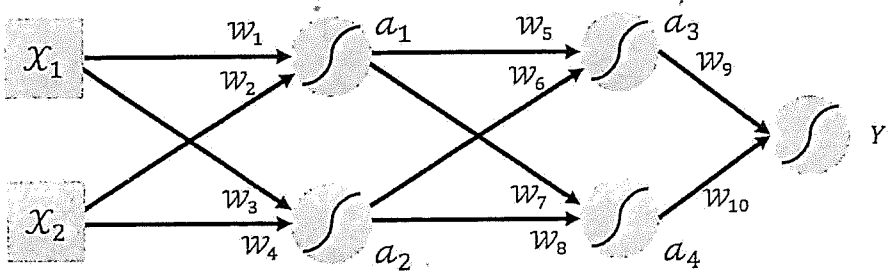
2. There is a two-dimensional array A. Suppose the address of A(1, 1) is 644 and the address of A(3, 3) is 676. What is the address of A (14, 14)? Please briefly explain your answer. (10 %)

3. Please calculate the result after forward propagation, and each cells' calculation is implemented in the figure (10%)



$$a_1 = \sigma\left(\sum_{i=1}^{N} X_i W_i\right), \qquad \sigma(x) = \frac{1}{1+e^{-x}}$$

The neural network is defined as below



$$(w_1, w_2, w_3, w_4, w_5, w_6, w_7, w_8, w_9, w_{10}) = (-1, -2, -4, -5, 5, -4, -5, 6, 3, -5)$$

What is the result $a_1 \sim a_4$ *and* Y when $(x_1,\ x_2) = (1,\ 1)$

4. Parameters are classified into three modes, 1. Call by address and 2. Call by value.
   (1) Please explain parameter passing by examples of two modes briefly (10%)
   (2) What would be the results of call_by_Mode function (test [element]) when the parameters are passed by two modes. (15%)

```
element    :  Integer
test       :  Integer array of size 2

funcation call_by_Mode(x: Integer)
{
  test[1]    := 7;
  element    := 4;
  x          :=x+3;
}

function Main ()
{
  test[1]    := 5;
  test[2]    := 6;
  element    := 7;
  call_by_Mode (test[element]);
}
```

Mode	Results		
	test[1]	test[2]	element
Call by address			
Call by vale			

The following table is included here so that it can be incorporated in Questions (6, 7, 8) for student reference. Questions in this test bank refer to this table as the "language description table."

Op-code Operand Description

1 RXY LOAD the register R with the bit pattern found in the memory cell whose address is XY.
Example: 14A3 would cause the contents of the memory cell located at address A3 to be placed in register 4.

2 RXY LOAD the register R with the bit pattern XY.
Example: 20A3 would cause the value A3 to be placed in register 0.

3 RXY STORE the bit pattern found in register R in the memory cell whose address is XY.
Example: 35B1 would cause the contents of register 5 to be placed in the memory cell whose address is B1.

4 0RS MOVE the bit pattern found in register R to register S.
Example: 40A4 would cause the contents of register A to be copied into register 4.

5 RST ADD the bit patterns in registers S and T as though they were two's complement representations and leave the result in register R.
Example: 5726 would cause the binary values in registers 2 and 6 to be added and the sum placed in register 7.

6 RST ADD the bit patterns in registers S and T as though they represented values in floating-point notation and leave the floating-point result in register R.
Example: 634E would cause the values in registers 4 and E to be added as floating-point values and the result to be placed in register 3.

7 RST OR the bit patterns in registers S and T and place the result in register R.
Example: 7CB4 would cause the result of ORing the contents of registers B and 4 to be placed in register C.

8 RST AND the bit patterns in register S and T and place the result in register R.
Example: 8045 would cause the result of ANDing the contents of registers 4 and 5 to be placed in register 0.

9 RST EXCLUSIVE OR the bit patterns in registers S and T and place the result in register R.
Example: 95F3 would cause the result of EXCLUSIVE ORing the contents of registers F and 3 to be placed in register 5.

A R0X ROTATE the bit pattern in register R one bit to the right X times. Each time place the bit that started at the low-order end at the high-order end. Example: A403 would cause the contents of register 4 to be rotated 3 bits to the right in a circular fashion.

B RXY JUMP to the instruction located in the memory cell at address XY if the bit pattern in register R is equal to the bit pattern in register number 0. Otherwise, continue with the normal sequence of execution. (The jump is implemented by copying XY into the program counter during the execute phase.)
Example: B43C would first compare the contents of register 4 with the contents of register 0. If the two were equal, the pattern 3C would be placed in the program counter so that the next instruction executed would be the one located at that memory address. Otherwise, nothing would be done and program execution would continue in its normal sequence.

C 000 HALT execution.
Example: C000 would cause program execution to stop.

5、Encode each of the following commands in terms of the machine language described in the language description table. (12%)

A. ROTATE the contents of register 7 to the right 5 bit positions.
B. JUMP to the instruction at address B2 if the content of register 2 equals that of register 0.
C. ADD the contents of registers 5 and 6 as thought they were values in floating-point notation and leave the result in register 4.
D. AND the contents of registers 5 and 6, leaving the result in register 4.

6. Decode each of the following instructions that were encoded using the language description table. (12%)

A. 4034
B. 8023
C. B288
D. 2345

7. The following table shows a portion of a machine's memory containing a program written in the language described in the language description table. Answer the questions below assuming that the machine is started with its program counter containing 00. (16%)

address	content	address	content
00	25	07	00
01	03	08	C0
02	20	09	00
03	F9	0A	C0
04	53	0B	00
05	05	0C	C0
06	33	0D	00

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A. What bit pattern will be in register 5 when the machine halts?
B. What bit pattern will be in register 0 when the machine halts?
C. What bit pattern will be in register 3 when the machine halts?
D. What bit pattern will be at memory location 00 when the machine halts?