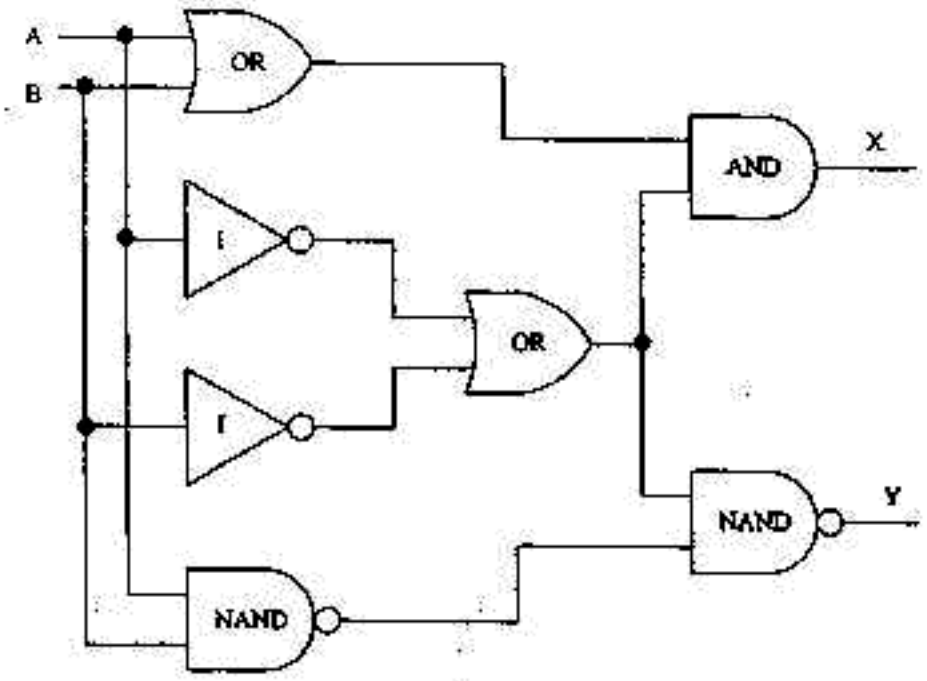
1. (10%) Draw the truth tables and write the boolean expressions for X and Y in the following logic circuit



2. (15%) Briefly explain and compare the following items:
   - Addesss bus, data bus, control bus.
   - Procedual language vs non-procedual language.
   - Passing by value vs passing by variable in function calls.
   - Source code vs object code vs executable code.
   - A stack vs a queue
   - ROM vs RAM
   - Batch vs interactive computer execution

3. (10%) Explain what do the below codes do. What's the output of the code execution.

```
Viod main(void)
{
      int fun(int n);
      printf("%d\n\n", fun(10));
}
int   fun (int n)
{     if (n <= 1) return (n);
      else return   n * fun(n-1);
}
```

4. (10%) An array A [n,m] stores 5 rows by 6 columns of 2-byte integers. In a 16-bit computer, given that A[1, 1] is at address 1000H, what is the address for A[4, 5]? Note: assuming C language is used.

5. (10%) 100 numbers are randomly stored in an array A[100]. Write one sorting program, Sort(), which can sort the array in either ascending or descending order.

   To sort the array in ascending order: Sort('A', A);
   To sort the array in descending order" Sort('D', A);

6. (10%) Compute $\sum_{n=1}^{k+1} a_{n-1}x^{n-1}$ will execute at least (a) times for addition and (b) times for multiplication. Explain your answers.

7. (5%) Check which of the following are usually performed by a program loader:
   (a) Check the program for system calls
   (b) Relocate the code or set a base integer
   (c) Allocate space for the program and data
   (d) Determine the print queue length
   (e) All of the above

8. (5%) A disk scheduling mechanism in an operating system causes the disk arm to sweep back and forth across the disk surface servicing all requests in its path. This scheduling is called:
   (a) First Come First Served(FCFS)
   (b) Shortest Seek Time First(SSTF)
   (c) Eschenbach scheme
   (d) Scan
   (e) None of the above

9. (15%) $f(x)=a_nx^n+a_{n-1}x^{n-1}+....+a_2x^2+a_1x+a_0$

(例如： $f(x)=3x^4-12x^3+5x^2-13x+45$)

吾人欲求算 $f(z)=?$(例如： $f(5)=?$)可利用 Horner's Method (synthetic division)，其方法敘述如下：

$b_n=a_n$

$b_{n-1}=a_{n-1}-zb_n$

$b_{n-2}=a_{n-2}-zb_{n-1}$

⋮

⋮

$b_0=a_0-zb_1$

最後所計算求得的 b_0 即為吾人所欲求的 $f(z)$. 假設多項式 $f(x)$ 的係數 a_0, a_1, a_2, a_3, ..., a_n 已經存入 a 陣列:

```
#define N 6
float a[N+1];
```

$f(z)=?$ 中的 z 值，也存入變數 z 中：

```
float z;
z=6;
```

試寫一段 C 程式計算 $f(z)=?$ 請勿再定義任何變數或陣列。

10. (10%) 以下 C 程式片段執行時列印的結果為何？

```
long int j;
float value;
value=0.0;
for(j=0; j<100000000; j++)
    value += 0.00000001;
if (value == 1.0)
    printf ("Perfect!\n");
else
    printf ("Error!\n");
```