1. (30%) Modify the following code to produce the output shown below. Use proper indentation techniques. You can only make changes by adding braces. Note: it is possible that no modification is necessary; or there is no way to create the output as requested. In either case, you still need to write down you answer with reasons.

(Note: 程式碼不能改變，僅能加大括弧，得到所要的輸出。如無法得到所要的輸出，也要說明)

```
if (y == 1)
if (x == 0)
printf("@@@@@\n");
printf("#####\n");
else
printf("$$$$$\n");
printf("&&&&&\n");
```

a. Assume x = 0 and y = 1, the following output is produced.
```
@@@@@
#####
```

b. Assume x = 1 and y = 1, the following output is produced.
```
@@@@@
#####
```

c. Assume x = 0 and y = 1, the following output is produced.
```
@@@@@
#####
&&&&&
```

d. Assume x = 1 and y = 1, the following output is produced.
```
@@@@@
#####
$$$$$
&&&&&
```

e. Assume x = 0 and y = 0, output nothing.

2. (10%) Consider the function `checkleap(year)` given below is to check if the specified year is a leap year (閏年). A year is a leap year if it can be divided by 400, or it can be divided by 4 and not divided by 100. So, year 2000 is a leap year; year 2016 is also a leap year; however, year 2100 is not a leap year. Finish the code below inside if expression.

```
int checkleap(int year){
    if( // add your code  )return 1; // a leap year
    else return 0; // not a leap yeaer
}
```

背面尚有試題

3. (10%) Show the output of the following program.

```c
void tower(int N, char to, char aux, char from){
  printf("(%d,%c,%c,%c)\n", N,to,aux,from);
  if(N==1) printf("%c -> %c\n", from, to);
  else{
    tower(N-1,aux,to,from);
    printf("%c -> %c\n", from, to);
    tower(N-1,to,from,aux);
  }
}
int main(){
  tower(N,'A','B','C');
}
```

4. (10%) Complete the function swap(A,B) below that can exchange the values of A and B.

```c
void swap(int *pA, int *pB){
    // give your code here
}
int main(){
    int A=10, B=20;
    swap(A,B);
    printf("A=%d, B=%d\n", A,B);  // get the result: A=20, B=10
}
```

5. (10%) What does the function mystery do? If *n* = 1357 is passed to mystery, what is the return value?

```c
int mystery(int n){
  int r = 0, divisor = 1000, multiplier = 1;
  while ( n > 10 ) {
    if ( n >= divisor ) {
      r += n / divisor * multiplier;
      n %= divisor;
      divisor /= 10;
      multiplier *= 10;
    } else
      divisor /= 10;
  }
  r += n * multiplier;
  return r;
}
```

6. (10%) Give a function to compute $sum(n_1, n_2)=n_1+(n_1+1)+(n_1+2)+...+n_2$, in which $n_1<n_2$.

7. (10%) Short answers.

   (a) Give three key properties that are in Java, but not in C.

   (b) Describe in details the meaning of the statement below.

```
pLotto = (Lotto *)malloc(sizeof(struct Lotto);
```

8. (10%) Give a class `Account` in Java to manage an account that can deposit money, withdraw money and show the balance.

```java
public class AccountTest{
    public static void main(String[] args){
        // 新開戶、帳號123456789，存進1000元
        System.out.println("Open a new account and deposit 1000 dollars");
        Account account = new Account("123456789", 1000);
        account.deposit(3000);     // 存進 3000 元
        System.out.println("Deposit 3000 dollars");
        System.out.println("Balance = "+account.getBalance());
        account.withdraw(2000);  // 提領 2000元
        System.out.println("Withdraw 2000 dollars");
        System.out.println("Balance = "+account.getBalance());
    }
}
// Screen output
Open a new account and deposit 1000 dollars
Deposit 3000 dollars
Balance = 4000
Withdraw 2000 dollars
Balance = 2000
```