資料結構作業 10/23

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第一題 題目:

Ackermann's function $A(m,n)$ is defined as follows:

$$A(m,n) = \begin{cases} n+1 & , \text{if } m = 0 \\ A(m-1, 1) & , \text{if } n = 0 \\ A(m-1, A(m,n-1)) & , \text{otherwise} \end{cases}$$

This function is studied because it grows very fast for small values of m and n. Write a recursive function for computing this function. Then write a nonrecursive algorithm for computing Ackermann's function.

利用遞迴的方式來完成阿克曼函數

程式實作檔案:10231.cpp

程式實作:

```c
int ackermann(int m, int n)
{
        if (m == 0) //M=0的情況
        {
                return n + 1;
        }
        else if (n == 0) //N=0的情況
        {
                return ackermann(m - 1, 1);
        }
        else
        {
                return ackermann(m - 1, ackermann(m, n - 1));
        }
}
```

以遞迴實作:

If m=0 會回傳 n+1

If m!=0&n==0 會再跑一次函式

```cpp
int main() {
    int m, n;
    cout << "M跟N中間請用空格隔開 #3 3"<<endl;
    cout << "請輸入M & N :";
    while (cin >> m >> n)
    {
        cout << "結果為 :" << ackermann(m, n)<<endl;
        cout << "請輸入M & N :";
    }
```

Main:

輸入 m 跟 n 的值來跑阿克曼函數

```
M跟N中間請用空格隔開 #3 3
請輸入M & N :3 3
結果為 :61
請輸入M & N :2 2
結果為 :7
請輸入M & N :2 1
結果為 :5
請輸入M & N :
```