

科目：資料結構與演算法

適用：資工系

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題

共 / 頁

第 / 頁

編號：341

1. The sequence $F(n)$ of Fibonacci numbers is defined by the recurrence relation

$$F(n) = F(n-1) + F(n-2),$$
with seed values

$$F(0) = 1, \text{ and } F(1) = 1.$$
 - a. If using the recursion method to calculate the value of $F(11)$, how many times of additive operations will be performed?
Explain your answer briefly. (15%)
 - b. If using the dynamic programming method to calculate the value of $F(11)$, how many times of additive operations will be performed?
Explain your answer briefly. (15%)
2. Give a comparison between the Radix Exchange Sort and the Straight Radix Sort. (20%)
3. For the following key sequence,
"ADIAMONDISFOREVER",
 - a. create a 2-3-4 tree. Explain your answer in detail. (10%)
 - b. draw a red-black tree to represent your 2-3-4 tree in the previous question. (10%)
 - c. explain the structural properties of the red-black trees. (10%)
4. Consider the following function F written in a C-like pseudo-code:

```

F ( triangle t, int depth )
{
    Subdivides t into four smaller congruent sub-triangles;
    Remove the central sub-triangle and fill it with a color;
    depth++;
    if ( depth <= 2 )
    {
        For each of the remaining sub-triangles, call:
        F ( sub-triangle, depth );
    }
}

```

Given a triangle T , show the result of executing: $F (T, 0)$. (20%)