

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 1 頁
第 1 頁

編號：381

1. How many different binary trees with 5 different nodes can be made?
Please explain your answer briefly. (25%)
2. Give a comparison between the "Package Wrapping" method and the "Graham Scan" algorithm for finding the convex hull. Explain your opinion in detail. (25%)
3. (Please explain your answers in detail.)
 - a. Use the following key sequence,
"ADIAMONDISFOREVER",
to create a 2-3-4 tree. (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. (5%)
4. The sequence $F(n)$ of Fibonacci numbers is defined by the recurrence relation:
$$F(n) = F(n-1) + F(n-2),$$
with seed values $F(0) = 1$, and $F(1) = 1$.
 - a. If using the recursion method to calculate the value of $F(15)$, how many times of additive operations will be performed? Explain your answer briefly. (10%)
 - b. If using the dynamic programming method to calculate the value of $F(15)$, how many times of additive operations will be performed? Explain your answer briefly. (15%)