

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。

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1. a. Explain the Koch curve. (10%)
b. The fractal dimension D for self-similar objects can be obtained from the following equation.
$$N * S^D = 1,$$
where, N is the number of subparts for subdivision and S is the scaling factor.

Give the D with explanation for the Koch curve, (15%)

($\ln 2 = 0.6931$, $\ln 3 = 1.0986$, $\ln 4 = 1.3863$, $\ln 5 = 1.6094$, $\ln 6 = 1.7918$,
 $\ln 7 = 1.9459$, $\ln 8 = 2.0794$, $\ln 9 = 2.1972$, $\ln 10 = 2.3026$, $\ln 11 = 2.3979$,
 $\ln 12 = 2.4849$)

2. In the Knapsack problem, if the size of each object is arbitrary real number, does dynamic programming method still work? Explain your opinion in detail. (15%)
3. a. Use the following key sequence,
"ADAMONDISFOREVER",
to create a 2-3-4 tree. Explain your answer in detail. (15%)
b. Transform your 2-3-4 tree into a red-black tree. (10%)
c. Explain the structural properties of red-black trees. (10%)
4. How many different binary trees can be made from 5 nodes: A, B, C, D, and E? Draw and explain your answer. (25%)

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