

題號： 309

國立臺灣大學 111 學年度碩士班招生考試試題

科目： 資料結構(C)

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1. (20%) Given a set of intervals in an array, write a pseudocode function that print all non-overlapping intervals after merging the overlapping intervals.

Note:

Input example 1: $a[0] = (1,3)$, $a[1] = (2,4)$, your function should print '(1,4)'

Input example 2: $a[0] = (1,3)$, $a[1] = (3,5)$, your function should print '(1,3), (3,5)'

2. (15%) Given a graph, write a pseudocode function that colors the graph's vertices such that no two adjacent vertices share the same color by minimizing the total number of colors used.
3. (20%) Given a string, write a pseudocode function that finds the longest subsequences of a string that is a palindrome.
4. (10%) Prove that, if a connected graph of N nodes has the property that removing any edge disconnects the graph, then the graph has $N - 1$ edges and no cycles.
5. (15%) Please explain how a 2-3 tree achieves the proposition: every path from root to null link has the same length.
6. (20%) Write a recursive function to calculate the height of a binary tree
Note: A node in a binary tree has two pointers, named 'left' and 'right', respectively, where the 'left' pointer is used to find the left child of the node and the 'right' pointer is used to find the right child. Your function will take a node as the input and return an integer.

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