A binary tree that is not full cannot correspond to an optimal prefix code.

T

To solve the vertex cover problem, there is a greedy algorithm that collects the vertex with the highest degree (i.e., the one covering the largest number of edges) and remove it from the graph at each stage. This greedy algorithm achieves an approximation ratio of 2.

F

The Huffman code is one kind of optimal prefix codes. For a given alphabet and its characters' frequencies，the Huffman codes may not be unique, but the Huffman code **length** of each character is unique.

F

Consider the problem of making change for n cents using the fewest number of coins. Assume that each coin's value is an integer.
The coins of the lowest denomination（面额） is the cent.

(I) Suppose that the available coins are quarters (25 cents), dimes (10 cents), nickels (5 cents), and pennies (1 cent). The greedy algorithm always yields an optimal solution.

(II) Suppose that the available coins are in the denominations that are powers of c, that is, the denominations are c^0, c^1, ..., c^k for some integers $c > 1$ and $k >= 1$. The greedy algorithm always yields an optimal solution.

(III) Given any set of k different coin denominations which includes a penny (1 cent) so that there is a solution for every value of n, greedy algorithm always yields an optimal solution.

Which of the following is correct?

- A. Statement (I) is false.
- B. Statement (II) is false.
- C. Statement (III) is false.
- D. All of the three statements are correct.

C

In Activity Selection Problem, we are given a set of activities $S = \{a_1, a_2, \ldots, a_n\}$ that wish to use a resource (e.g. a room). Each a_i takes place during a time interval $[s_i, f_i)$.

Let us consider the following problem: given the set of activities S, we must schedule them all using the minimum number of rooms.

Greedy1:
Use the optimal algorithm for the Activity Selection Problem to find the max number of activities that can be scheduled in one room. Delete and repeat on the rest, until no activities left.

Greedy2:
- Sort activities by start time. Open room 1 for a_1.
- for $i = 2$ to n
  if a_i can fit in any open room, schedule it in that room;
  otherwise open a new room for a_i.

Which of the following statement is correct?

- A. None of the above two greedy algorithms are optimal.
- B. Greedy1 is an optimal algorithm and Greedy2 is not.
- C. Greedy2 is an optimal algorithm and Greedy1 is not.
- D. Both of the above two greedy algorithms are optimal.

C

Given a set of activities $S = \{a_1, a_2, \cdots, a_n\}$. Each a_i takes place during a time interval $[s_i, f_i)$.
If an instance S given as the following, the maximum-size of mutually compatible activities is __.

i	1	2	3	4	5	6	7	8	9	10	11
s_i	0	1	2	3	3	5	5	6	8	11	12
f_i	6	4	14	5	9	7	9	10	11	12	16

A. 4

B. 5

C. 6

D. 7

答案正确：2 分 创建提问