Quiz 2

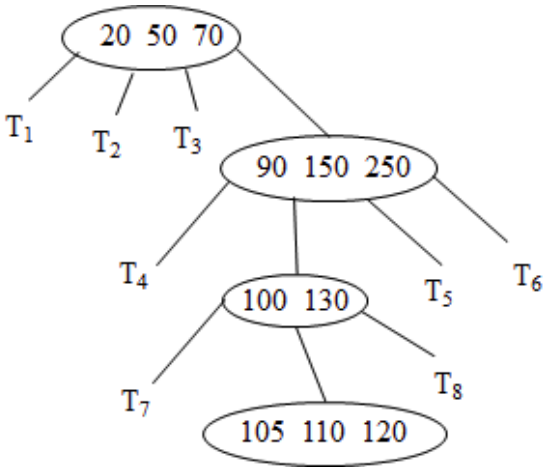
Started: Feb 10 at 10:15am

Quiz Instructions

Question 1 — 10 pts

Consider the B-tree below , which has the minimu m degree t = 2. Illustrate the operation B-T ree-Insert (T, 125).

Show your work, with the tree after each step, similar to the examples done in class.



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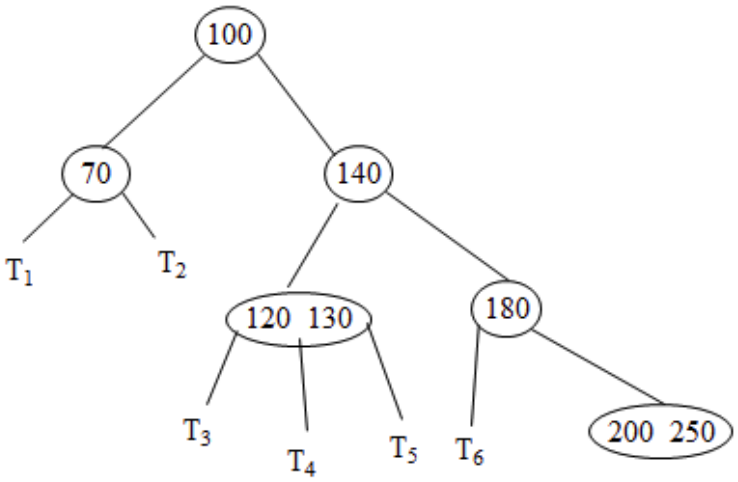
Question 2 — 20 pts

- (10 pts) Explain an algorithm for an operation B-T ree-DeleteMax (T) which deletes the maximum key from a B-Tree T.
- (10 pts) Use your algorithm to delete the maximum key from the B-T ree below, which has the minimum degree t = 2. Show all the steps, similar to the examples done in class.



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Question 3

15 pts

Design a backtracking algorithm to s olve the m-Independent Set Problem (defined below). **You have to use the general framework discussed in class. All other attempts will not be graded.**

(10 pts) W rite the pseudo-code

(5 pts) Analyze its worst-case running time.

m-Independent Set Problem: Given a graph G with n nodes, where n > 2, and a value m such that 1 < m < n, find whether G has an independent set of size m. If the answer is true, then print such an independent set of size m. Note that G, m, and n are given as input in this problem.

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Question 4

10 pts

We are using Johnson-T rotter algorithm to generate permutations for n = 4. The first four permuta tions generated are:

$\leftarrow\ \leftarrow\ \leftarrow\ \leftarrow$ 1 2 3 4 $\quad \leftarrow\ \leftarrow\ \leftarrow\ \leftarrow$ 1 2 4 3 $\quad \leftarrow\ \leftarrow\ \leftarrow\ \leftarrow$ 1 4 2 3 $\quad \leftarrow\ \leftarrow\ \leftarrow\ \leftarrow$ 4 1 2 3

Write the next 5 permutations generate by the alg orithm, in the correct order , including the arrows.

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