

Universidade Estadual do Norte Fluminense Darcy Ribeiro

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Período: 4º

Disciplina: Estrutura de dados II

Turno: Diurno

Nome do Aluno: **Matrícula:**

92 24 6 7 11 8 22 4 5 16 19 20 78

The diagram illustrates the evolution of a binary tree structure through five stages, showing the insertion of new nodes and the resulting changes in subtree sizes. Each node is represented by a box containing three numbers, where the first number is the node's value and the next two are the sizes of its left and right subtrees, respectively.

Stage 1: The root node is 24 (left subtree size 6, right subtree size 92). It has two children: a left child 6 (left subtree size 24, right subtree size 92) and a right child 92 (left subtree size 6, right subtree size 11).

Stage 2: The root node is 8 (left subtree size 24, right subtree size 92). It has three children: a left child 6 (left subtree size 4, right subtree size 7), a middle child 11 (left subtree size 22, right subtree size 92), and a right child 92 (left subtree size 6, right subtree size 11).

Stage 3: The root node is 6 (left subtree size 8, right subtree size 24). It has four children: a left child 4 (left subtree size 5, right subtree size 7), a middle child 7 (left subtree size 11, right subtree size 16), a right child 11 (left subtree size 22, right subtree size 92), and a right child 92 (left subtree size 6, right subtree size 11).

Stage 4: The root node is 19 (left subtree size 6, right subtree size 24). It has three children: a left child 6 (left subtree size 4, right subtree size 5), a middle child 7 (left subtree size 11, right subtree size 16), a right child 11 (left subtree size 22, right subtree size 92), and a right child 92 (left subtree size 6, right subtree size 11).

Stage 5: The root node is 19 (left subtree size 6, right subtree size 24). It has three children: a left child 6 (left subtree size 4, right subtree size 5), a middle child 7 (left subtree size 11, right subtree size 16), a right child 11 (left subtree size 22, right subtree size 92), and a right child 92 (left subtree size 6, right subtree size 11).

2.- [2,0 Pontos] Dada a árvore 2-3-4 mostrada na Figura 1.

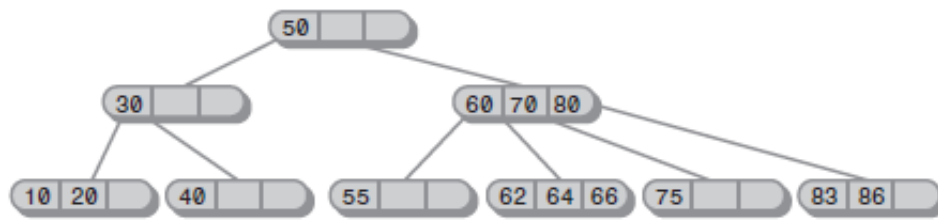


Figura 1. Árvore 2-3-4.

Construa uma árvore vermelha-preta que seja equivalente a ela.

3.- [2,0 Pontos] Desenhe duas árvores B de ordem 3, criadas pela inserção de dados nas duas sequências mostradas abaixo:

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 89 | 78 | 8 | 19 | 20 | 33 | 56 | 44 |
| 44 | 56 | 33 | 20 | 19 | 8 | 78 | 89 |