

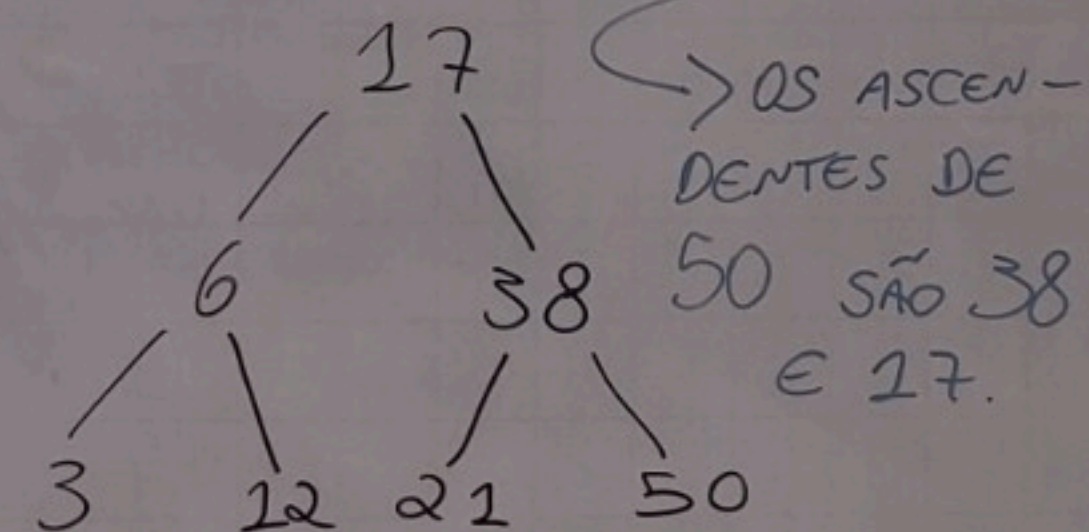
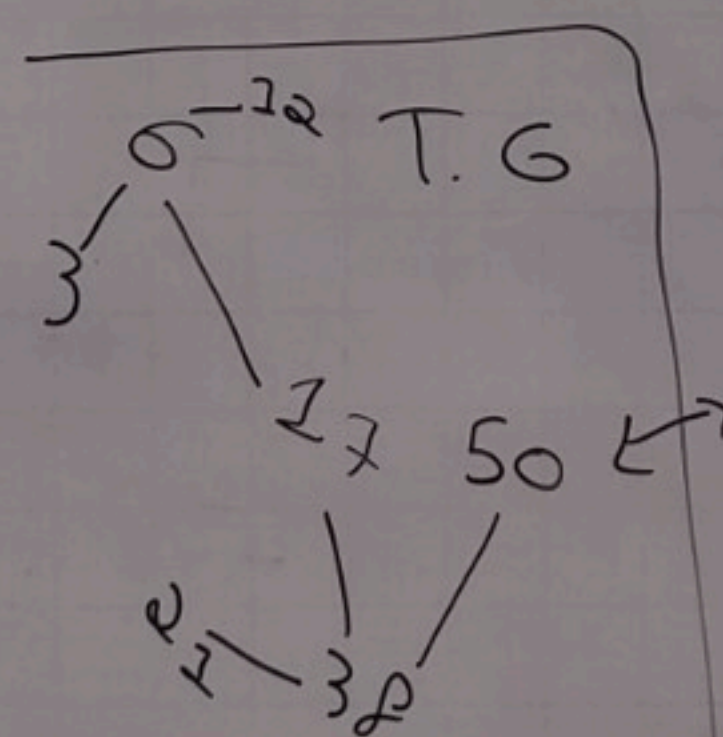
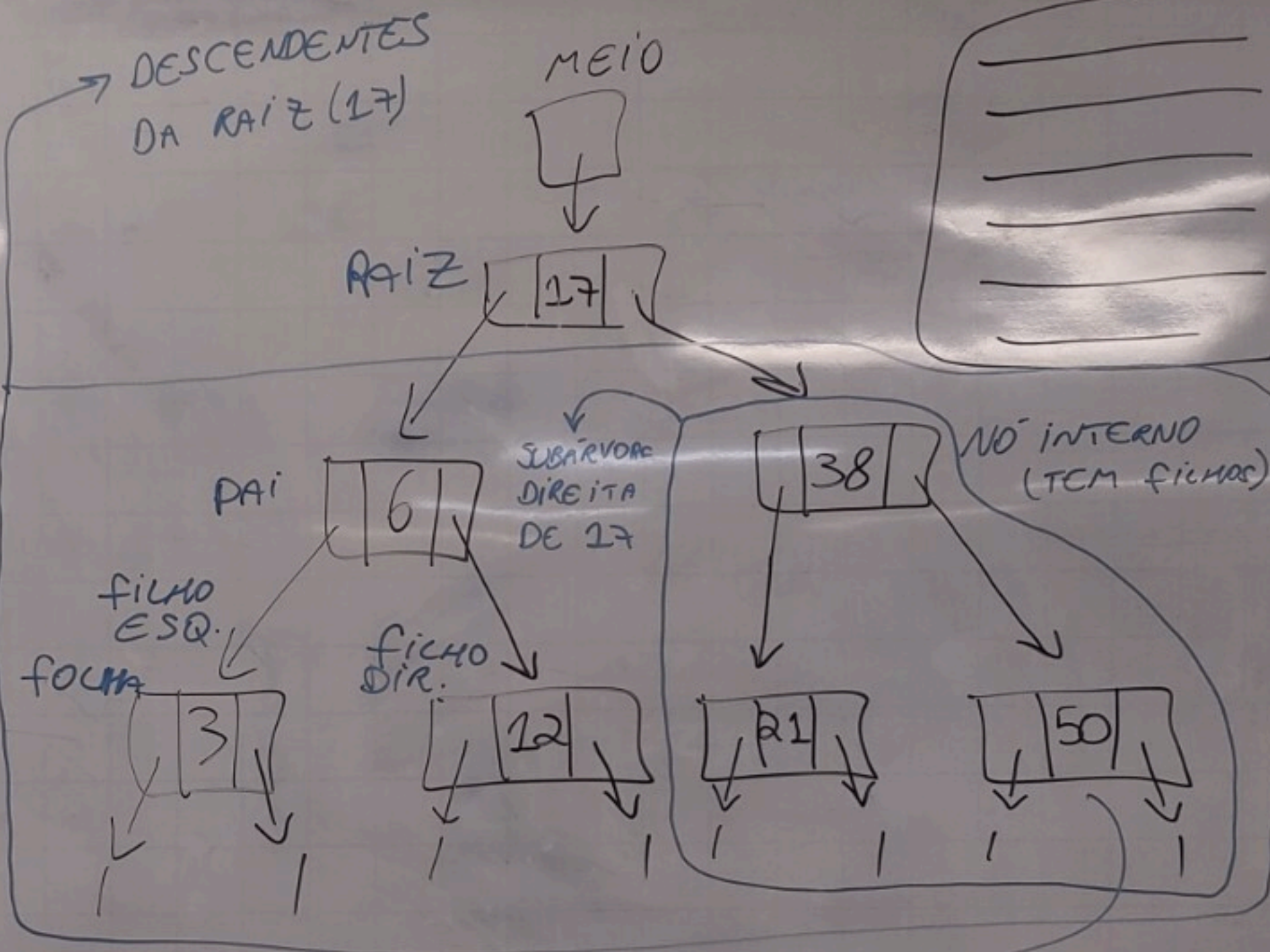
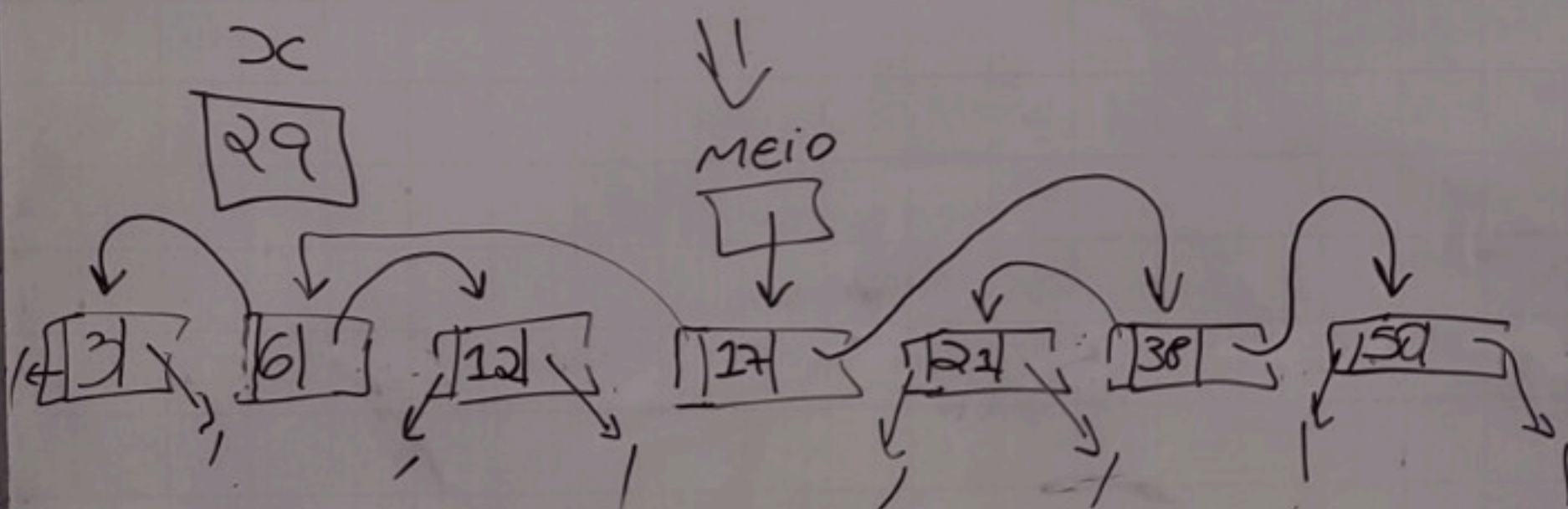
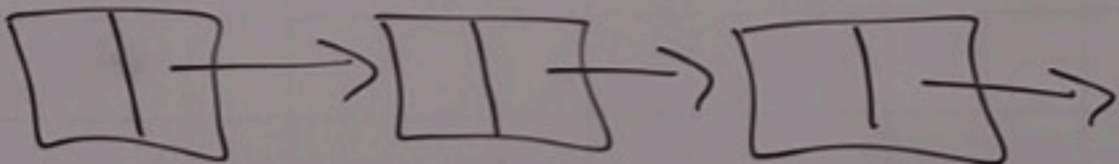
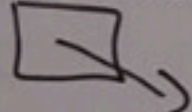
UNIVERSIDADE FEDERAL DO CEARÁ

ESTRUTURAS DE DADOS - TI0140 2022.2 T02A

AULA 20 - 24/10/2022

# 1. INTRODUÇÃO:

início





DIREITA DE  $n$  É MAIOR QUE ' $n$ '.

## 2. OPERAÇÕES EM ÁRVORE BINÁRIA DE BUSCA:

a) CRIAÇÃO:

RAIZ  
↓  
/

b) INSERÇÃO:

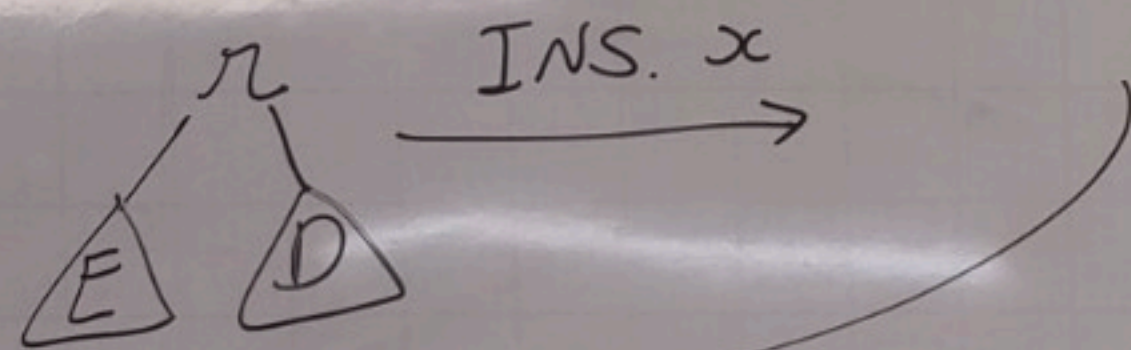
b.1) SE A ÁRVORE ESTÁ VAZIA:

RAIZ      INS.  $x$       RAIZ  
↓      →      ↓  
/       $x$

NUMA ÁRVORE BINÁRIA DE BUSCA, TODO NÓ <sup>'n'</sup> TEM DE 0 A 2 FILHOS (CADA UM SENDO O (ÚNICO) FILHO ESQUERDO OU DIREITO) E É TAL QUE (1) TODO NÓ  $x$  DA SUBÁRVORE ESQ. DE  $n$  É MENOR QUE  $n$  E (2) TODO NÓ  $y$  DA SUBÁRVORE

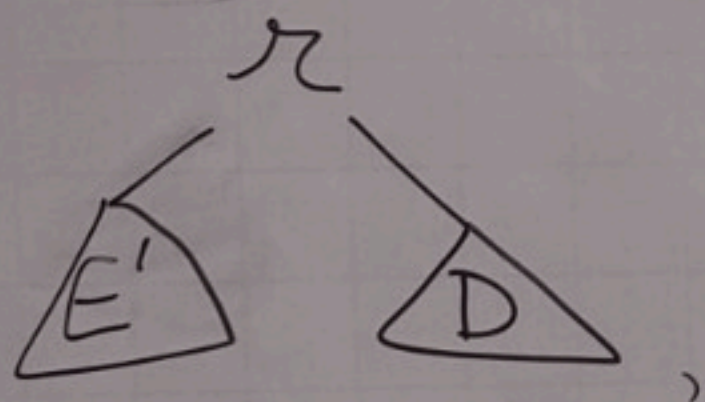


6.2) Se a árvore não está vazia:



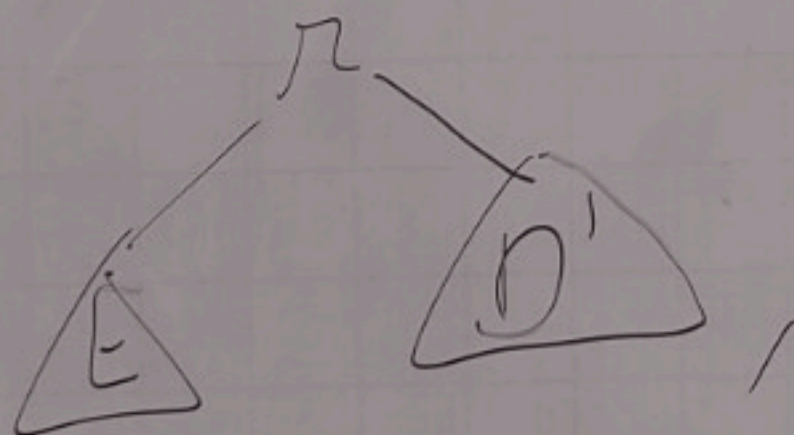
→ SÃO 2 CASOS:

Se  $x < r$ :



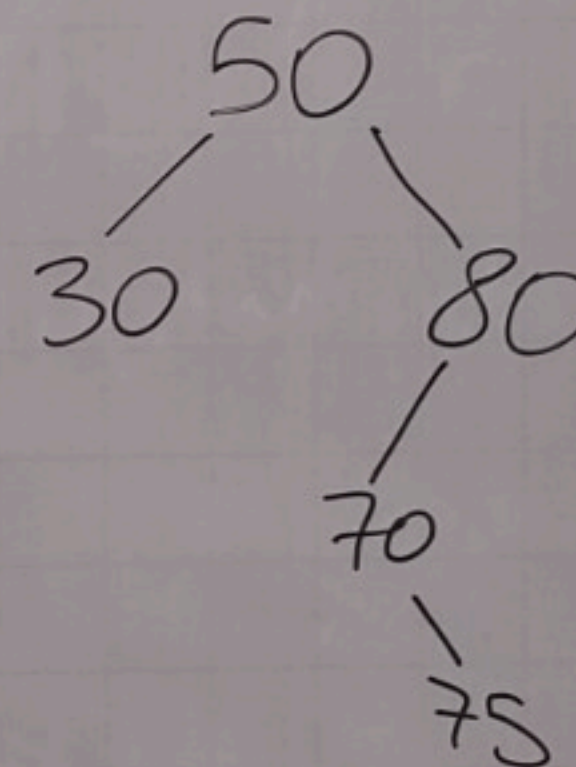
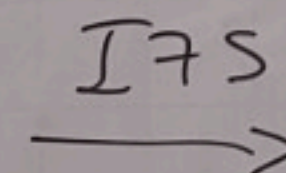
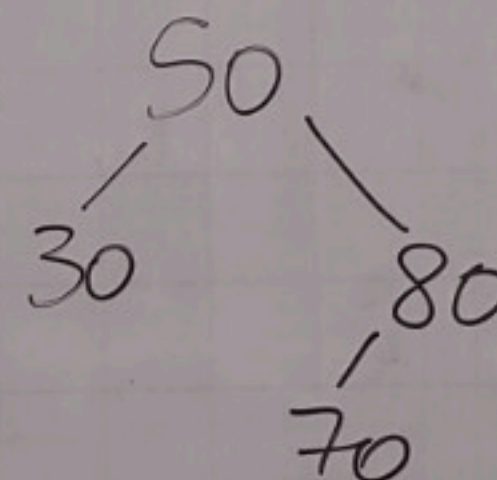
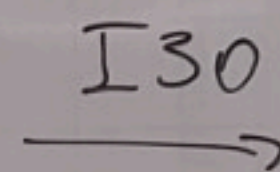
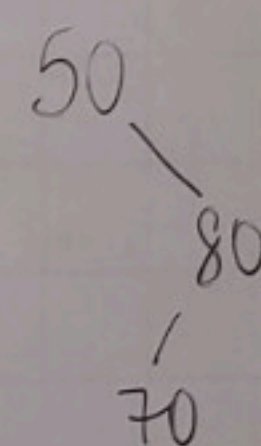
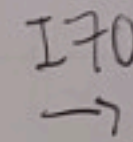
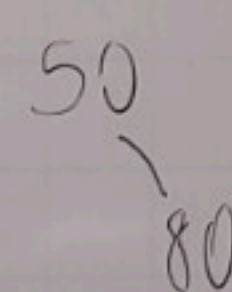
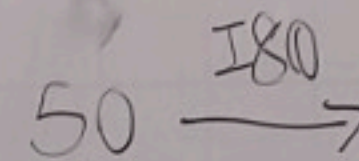
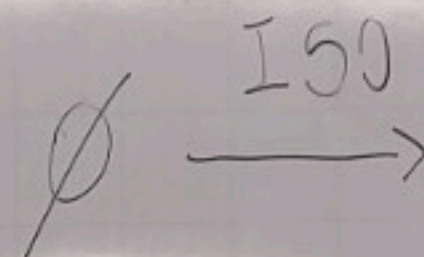
ONDE  $E'$  É O  
RESULTADO DA INSERÇÃO  
DE  $x$  EM  $E$ .

Se  $x > r$ :

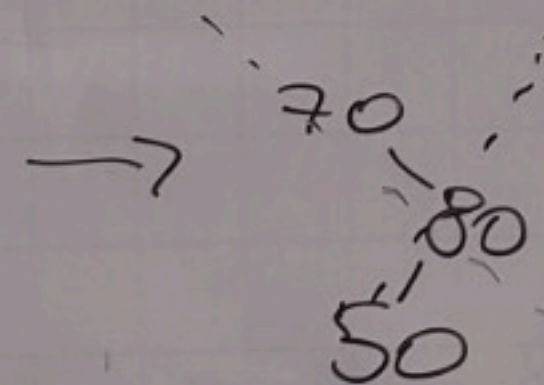
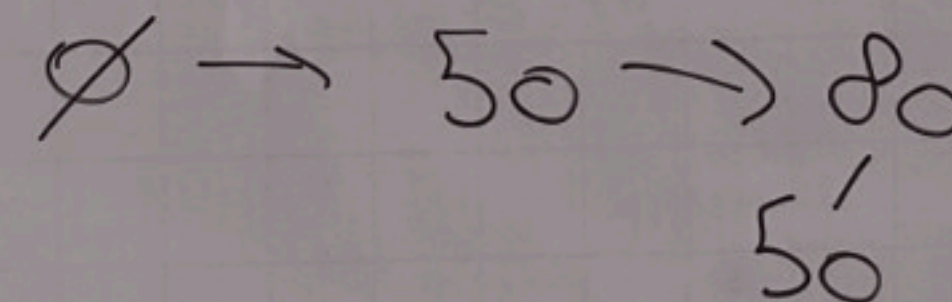


ONDE  $D'$  É O RESULTADO  
DA INSERÇÃO DE  $x$  EM  $D$ .

EXEMPLOS:



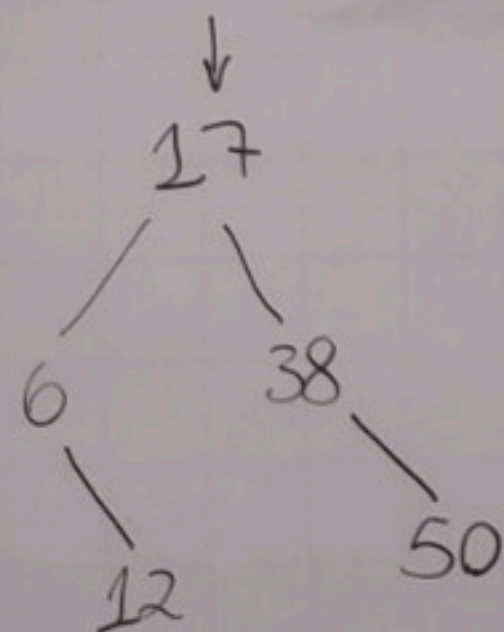
OUTRA ESTRATÉGIA  
(NÃO É BDA):





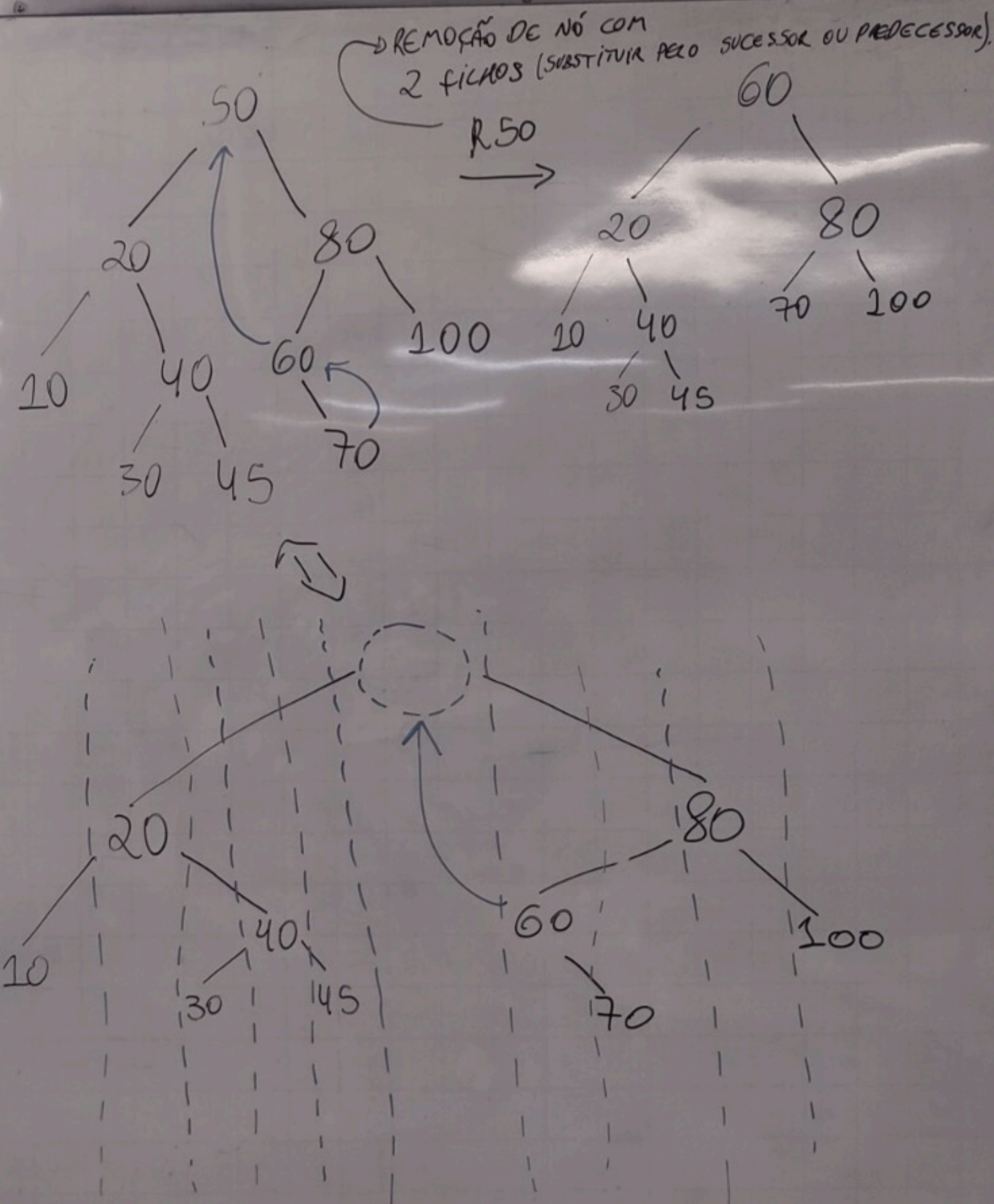
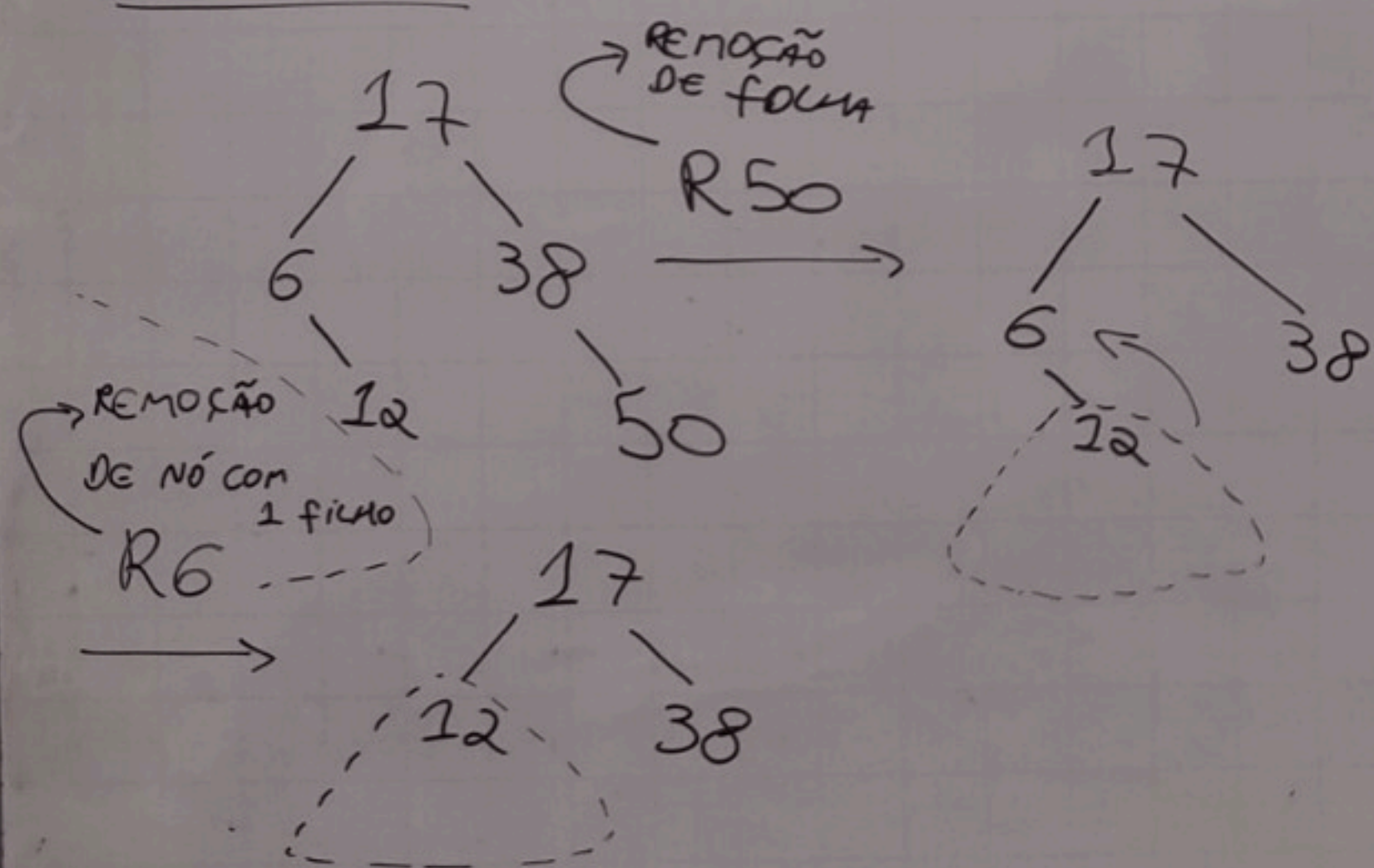
c) BUSCA:

$x$   
20



d) REMOÇÃO

EXEMPLOS:





### 3. IMPLEMENTAÇÃO

```
STRUCT Noh { INT ELEM; Noh *ESQ, *DIR; };
```

```
STRUCT ArvBB  
{  
    Noh *RAIZ;
```

```
ArvBB ( ) : RAIZ(NULLPTR) { }
```

```
// ArvBB ( ) { RAIZ=NULLPTR; }
```

```
VOID INSERIR (INT E)
```

```
{  
    Noh *n = NEW Noh {E, NULLPTR, NULLPTR};  
    !  
    !
```

```
if (RAIZ == NULLPTR) RAIZ = n;
```

```
ELSE  
{
```

```
    Noh *ATUAL = RAIZ;
```

```
    FOR(;;) // WHILE (TRUE)
```

```
    {  
        if ( E n->ELEM < ATUAL->ELEM )
```

```
        {  
            if ( ATUAL->ESQ == NULLPTR )
```

```
                { ATUAL->ESQ = n; BREAK; }
```

```
            ELSE
```

```
                { ATUAL = ATUAL->ESQ; }
```

```
        }  
        ELSE
```

```
        {
```

```
            .
```

```
        }
```

```
    }
```