

Q1

2,0

	Melhor	Pior
Array ã-ord	$O(n)$	$O(n)$
Array ord	$O(1)$	$O(1)$
Lista ord	$O(n)$	$O(n)$
BST	$O(\lg n)$	$O(n)$

Q2

2,0

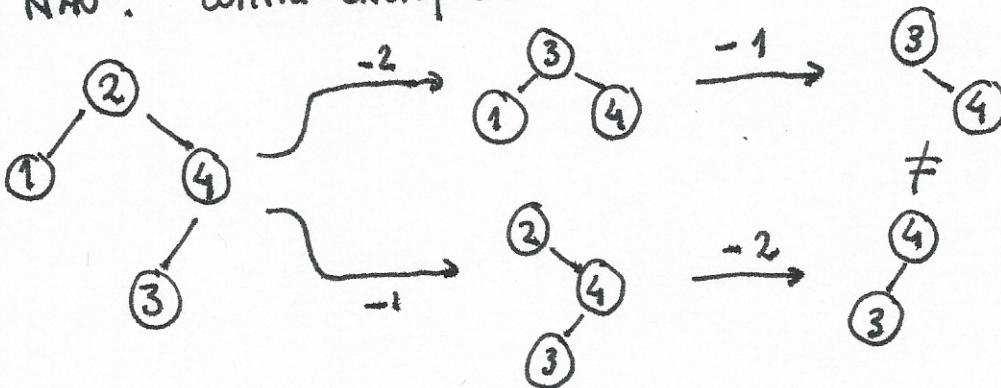
$V = \langle 0, 1, 2, 3, 4, 5, 6, 7 \rangle$

O pivô é sempre o menor ou maior elemento do trecho  $\rightarrow$  Tempo =  $O(n^2)$

Q3

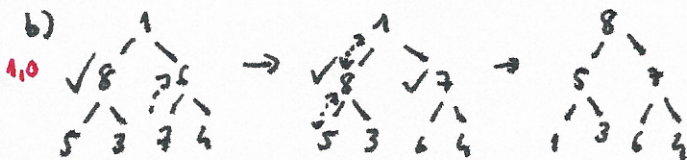
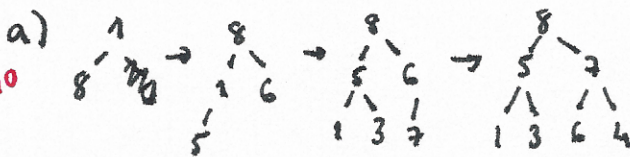
1,0

NAO. Contra-exemplo:



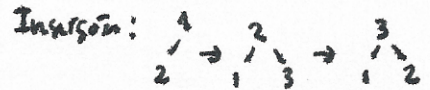
Q4

1,0



c) NAO. Contra-exemplo

1,0 H = <1, 2, 3>



Q5

a)		
1. U(A,B)	$\begin{array}{c} A_2 \quad C_1 \quad \dots \quad H_1 \\   \\ B_1 \end{array}$	(A,B)
2. U(C,D)	$\begin{array}{c} A_2 \quad C_2 \quad E_1 \quad \dots \quad H_1 \\   \quad   \\ B_1 \quad D_1 \end{array}$	(A,B) (C,D)
3. U(E,F)	$\begin{array}{c} A_2 \quad C_2 \quad E_2 \quad G_1 \quad H_1 \\   \quad   \quad   \\ B_1 \quad D_1 \quad F_1 \end{array}$	(A,B) (C,D) (E,F)
4. U(G,H)	$\begin{array}{c} A_2 \quad C_2 \quad E_2 \quad G_2 \\   \quad   \quad   \quad   \\ B_1 \quad D_1 \quad F_1 \quad H_1 \end{array}$	(A,B) (C,D) (E,F) (G,H)
5. U(A,C)	$\begin{array}{c} A_3 \quad E_2 \quad G_2 \\ / \quad   \quad   \\ B_1 \quad C_2 \quad F_1 \quad H_1 \\   \\ D_1 \end{array}$	(A,B) (C,D) (E,F), (G,H), (A,C)
6. U(F,H)	$\begin{array}{c} A_3 \quad E_3 \\ / \quad   \quad   \quad   \\ B_1 \quad C_2 \quad F_1 \quad G_2 \\   \quad   \\ D_1 \quad H_1 \end{array}$	(A,B) (C,D) (E,F) (G,H), (A,C), (E,G)
7. U(D,H)	$\begin{array}{c} A_4 \\ / \quad   \quad   \quad   \\ B_1 \quad C_2 \quad E_3 \\   \quad   \quad   \\ D_1 \quad F_1 \quad G_2 \\   \\ H_1 \end{array}$	(A,B) (C,D) (E,F) (G,H) (A,C) (E,G) (A,E)
8. U(F,G)	Igual a 7 $\uparrow$	(A,B) (C,D) (E,F), (G,H) (A,C) (E,G) (A,E) (A,A)
9. undo	Igual a 7	Igual a 7
10. undo	Igual a 6	Igual a 6
b)		
7. U(D,H)	$\begin{array}{c} A_4 \\ / \quad   \quad   \quad   \\ B_1 \quad C_2 \quad D_1 \quad E_3 \\   \quad   \quad   \\ F_1 \quad G_2 \quad H_1 \end{array}$	(A,B) (C,D) (E,F) (G,H) (A,C) (E,G) (A,E)
8. U(F,G)	$\begin{array}{c} A_4 \\ / \quad   \quad   \quad   \\ B_1 \quad C_2 \quad D_1 \quad E_3 \quad F_1 \quad G_2 \\   \\ H_1 \end{array}$	(A,B) (C,D) (E,F) (G,H) (A,C) (E,G) (A,E) (A,A)

Não é possível desfazer as uniões pois estas podem modificar as árvores originais. O undo 9 não tem ~~em~~ informação para reconstruir a floresta 7, por ex, como saber que F1 era filho de E3?