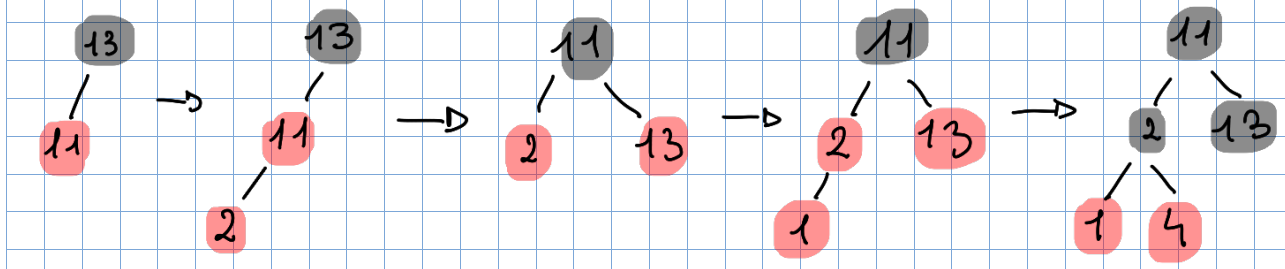
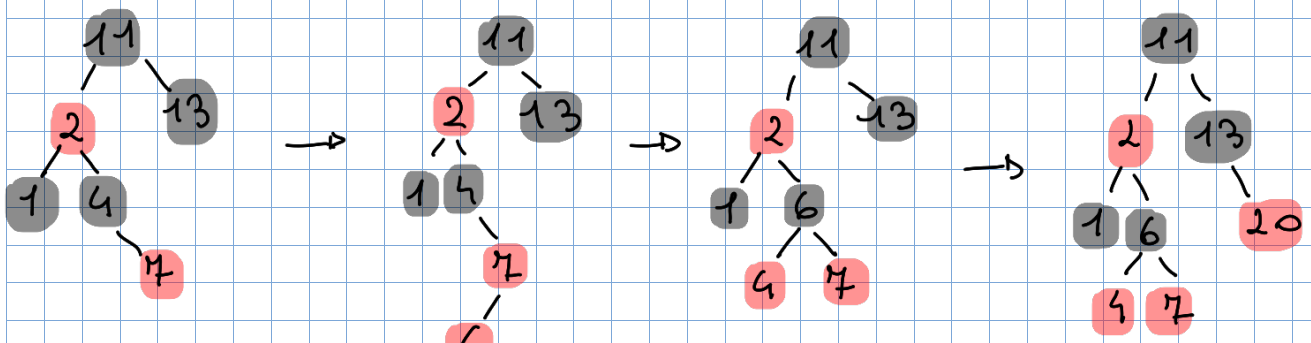
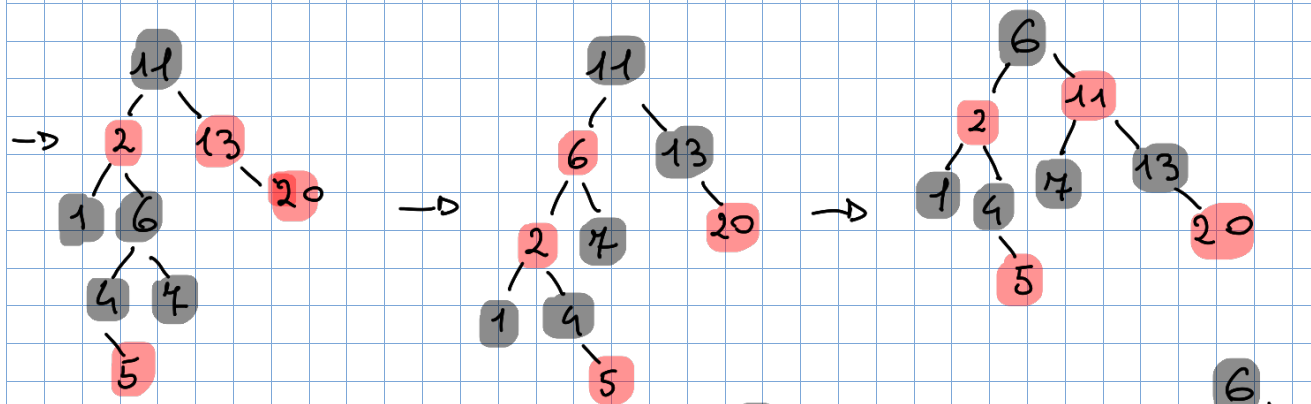
Esercizio di riepilogo

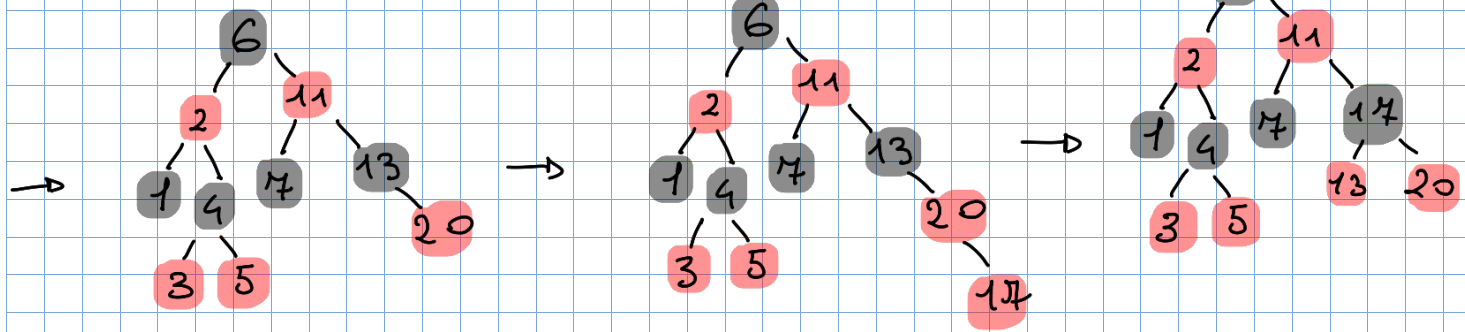
$n \rightarrow h \leq 2 \lfloor \log(n+1) \rfloor$

13 11 2 1 4 7 6 20 5 3 17

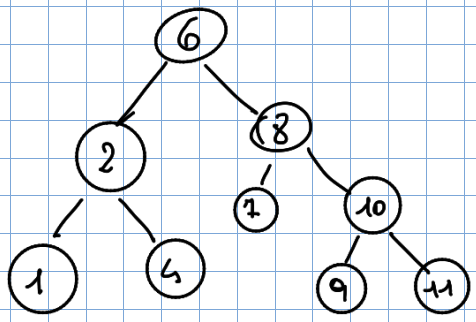


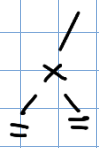


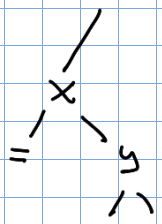




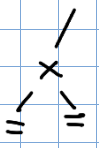
Cancellazione di un nodo

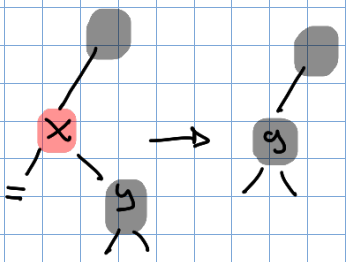


1) 

2) 

} nell'eliminazione normale questi sono i due casi di eliminazione

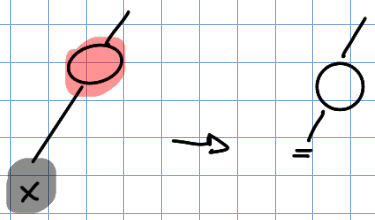
1) 

2) 

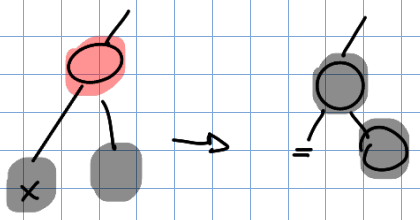
} la cancellazione di un nodo non foglia richiede molte

e se cancello un nodo nero

1) Padre nodo un figlio nero

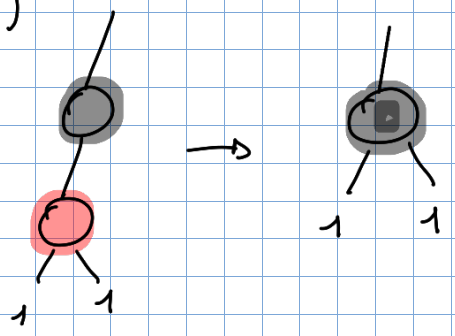


2) Padre nodo due figli neri



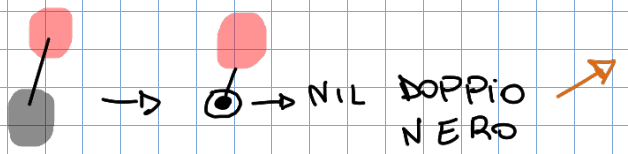
} Caso problematico

3)



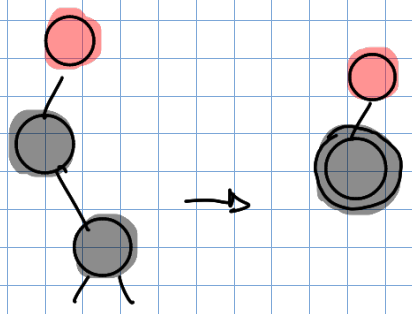
Casi problematici:

1)



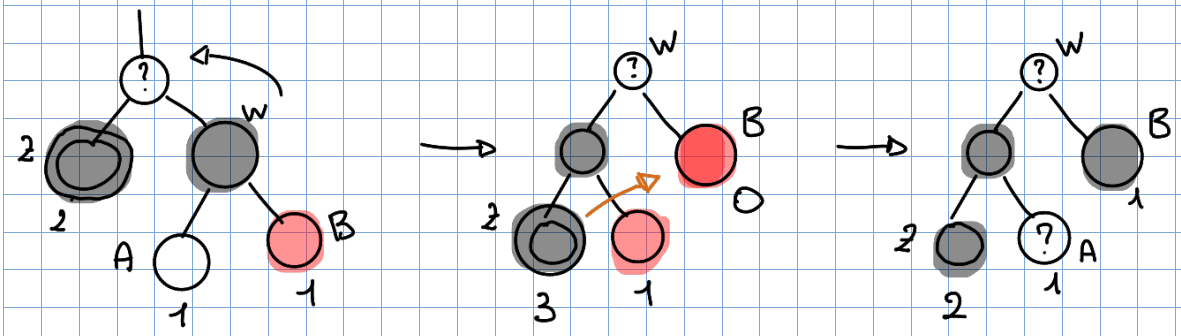
→ due archi doppio nero

2)

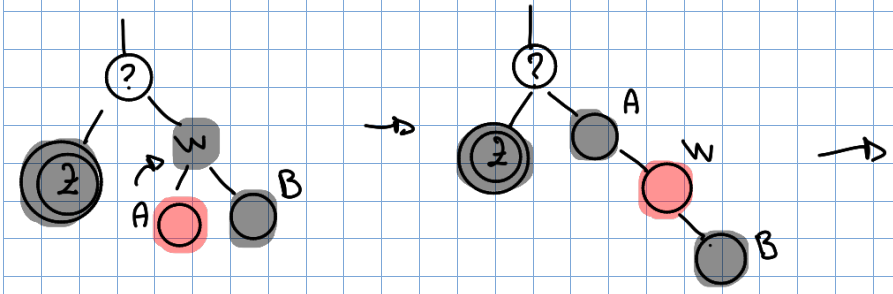


Come eliminare un nodo nero o doppio nero

CASO 1.1 w nero con almeno un figlio rosso (B è rosso)

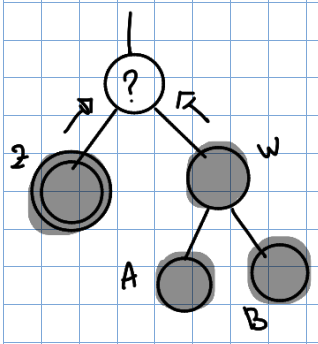


CASO 1.2 B nero → A è rosso

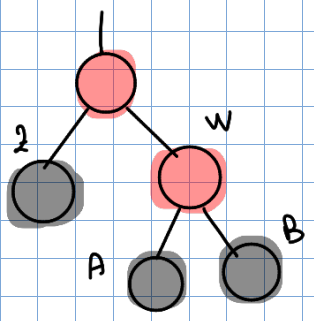


CASO 2

w è nero con entrambi i figli neri

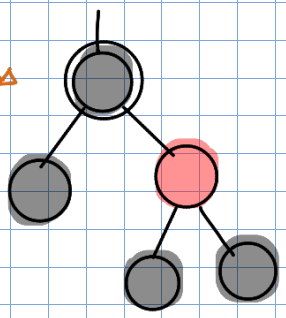


se i rossi figli cedono un token nero al padre



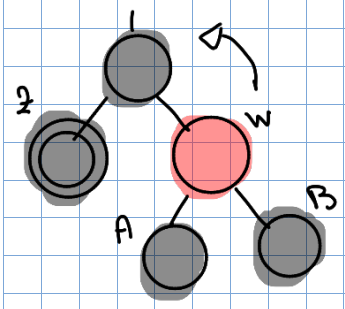
se il padre è ...

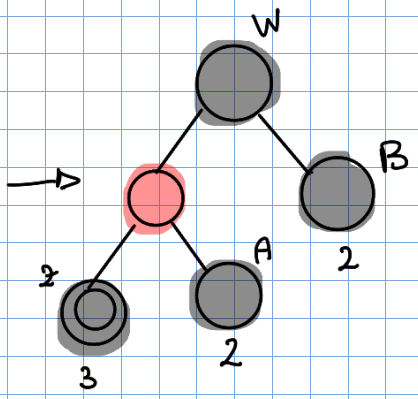
se i rossi figli cedono un token nero al padre



doppio nero sale fino a quando gli trovo un posto se arriva fino alla radice lo togliamo

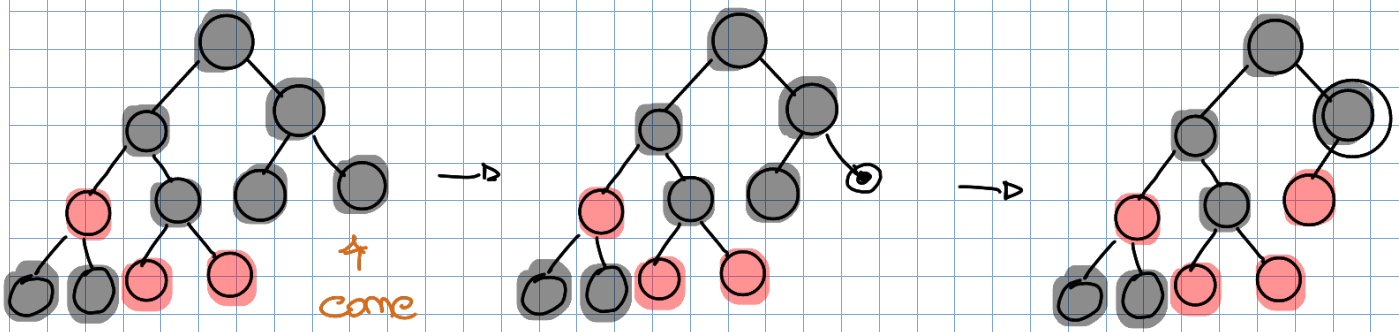
CASO 3 w è rosso → nonno nero

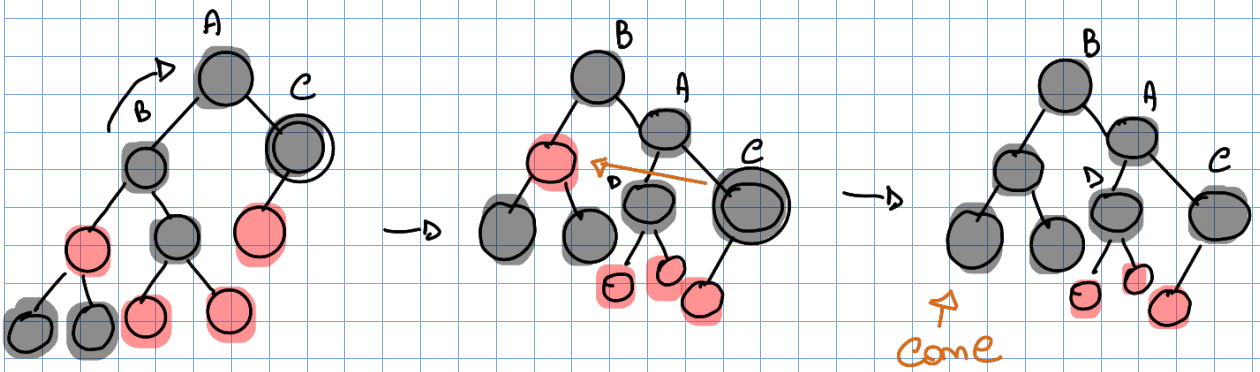


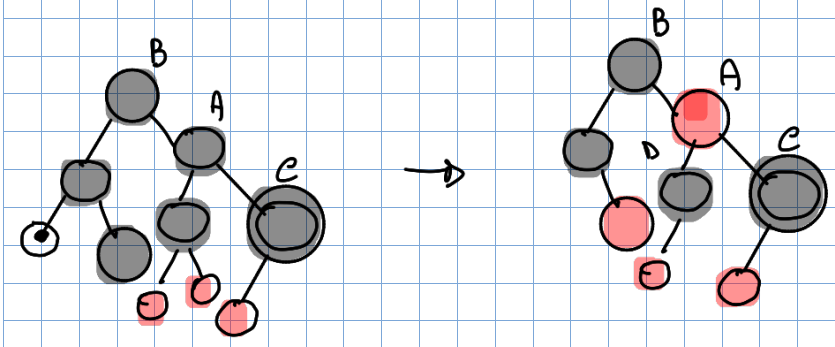


risolviamo usando i casi precedenti

Esercitazione

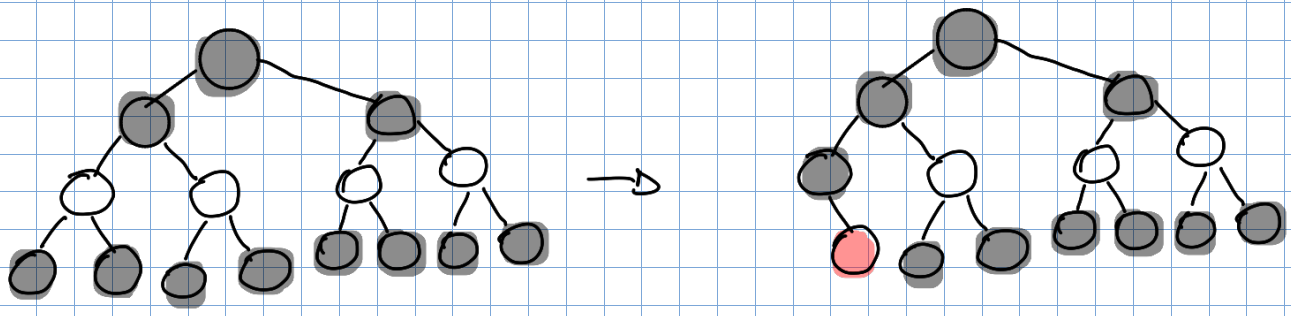


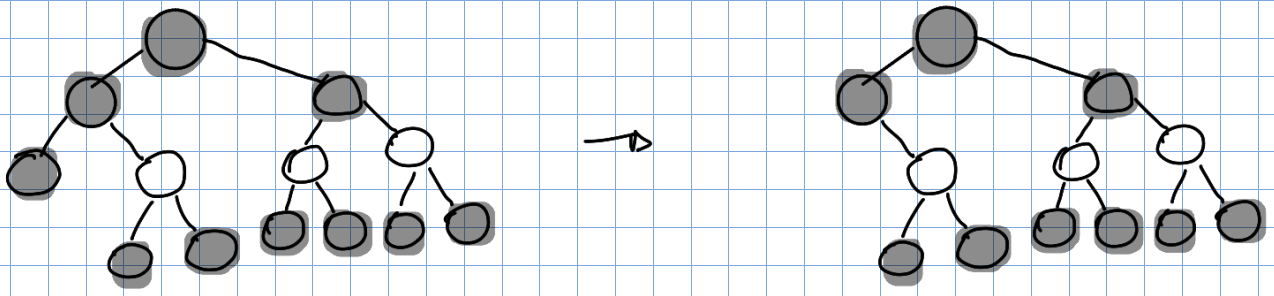




Esercizi esami

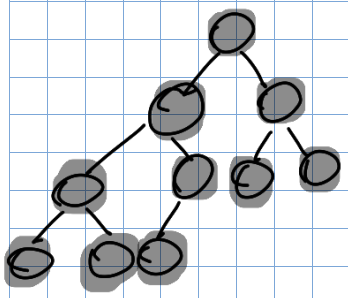
Cancellazione del nodo più piccolo



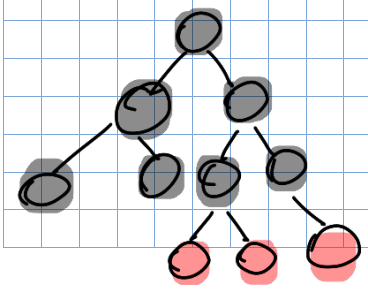


Va troppo veloce DPCR

Fornire l'esempio di RB-tree con 10 nodi tali che:
tale che se eliminiamo un nodo hB diminuisce di 1



albero non valido



albero valido

Forse un' altro esempio in cui l' inserimento aumenta hb