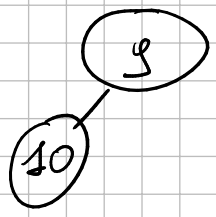
1

Fin-Heap

Inserisco < 10, 9, 6, 8, 4, 11, 13, 12, 7, 5, 3, 1, 2 >

Ins 10:

Ins 9:



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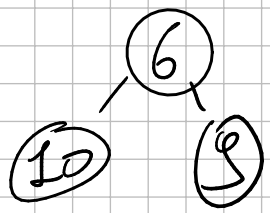

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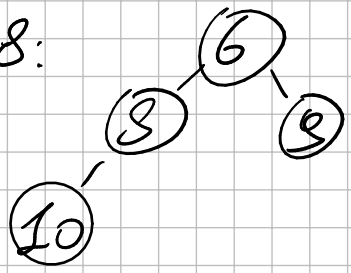

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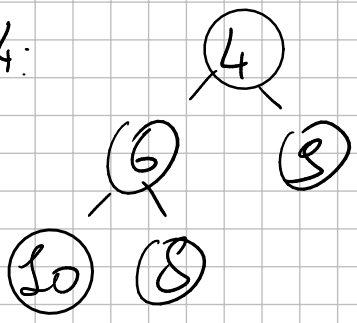

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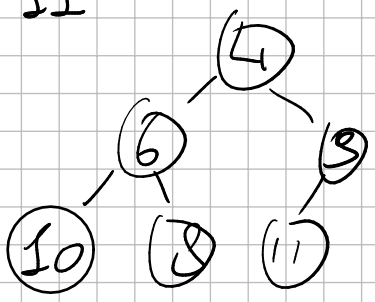
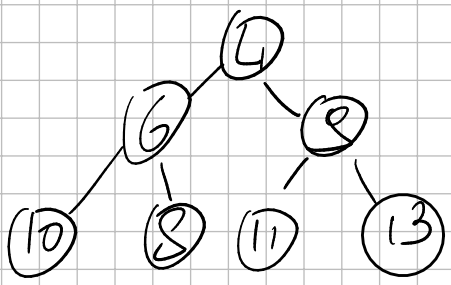
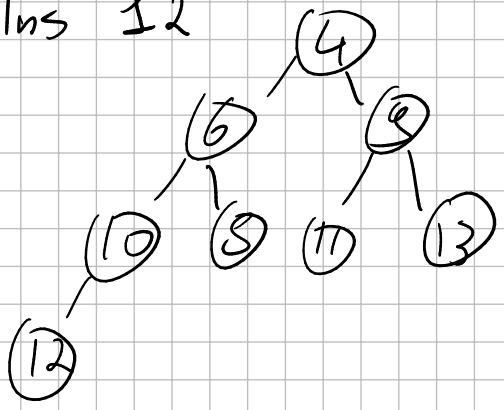


Ins 13



Ins 12



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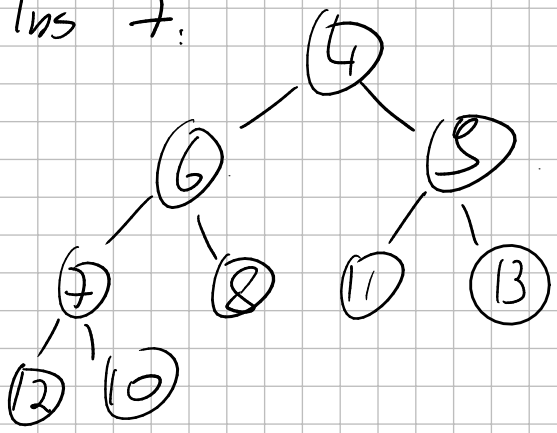

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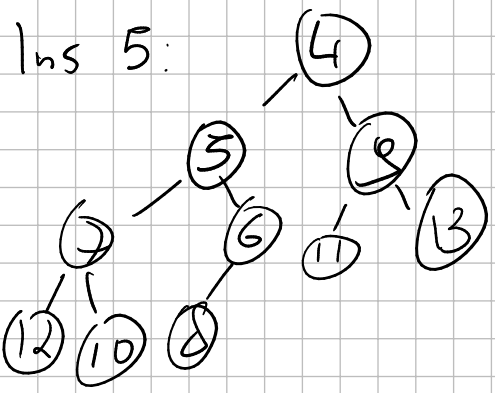

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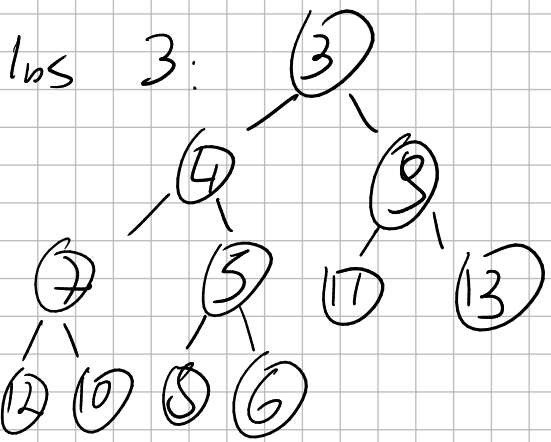

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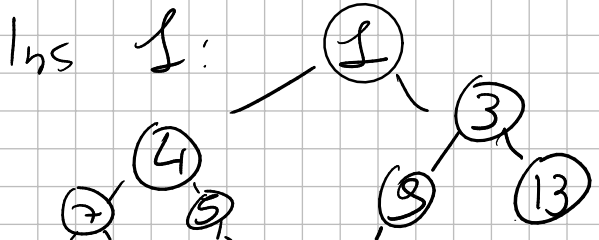

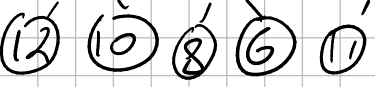

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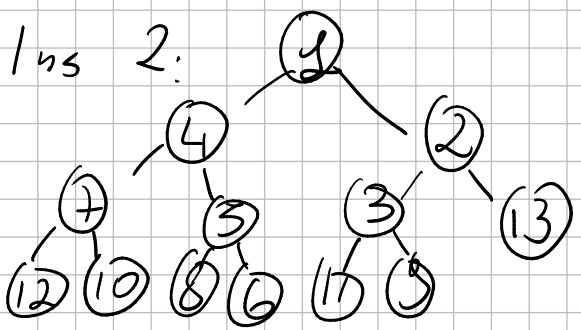
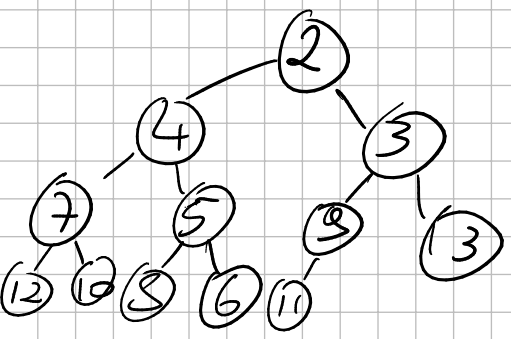


Rimuovo il minimo



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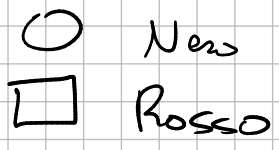
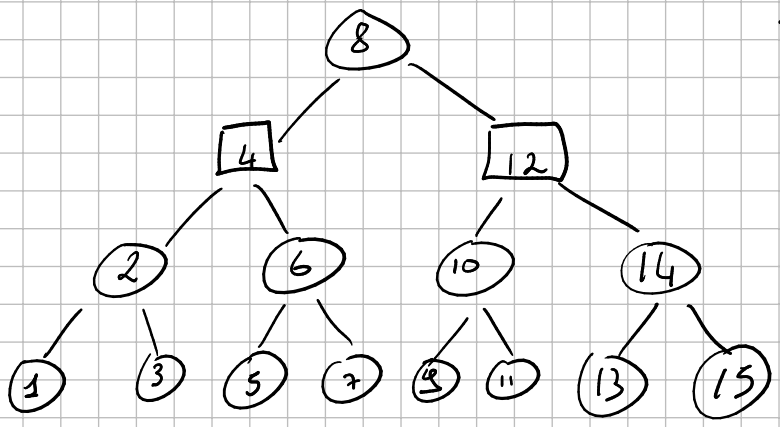
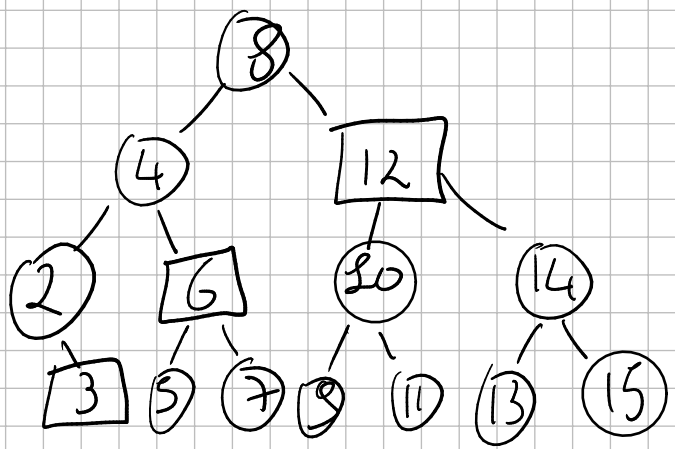
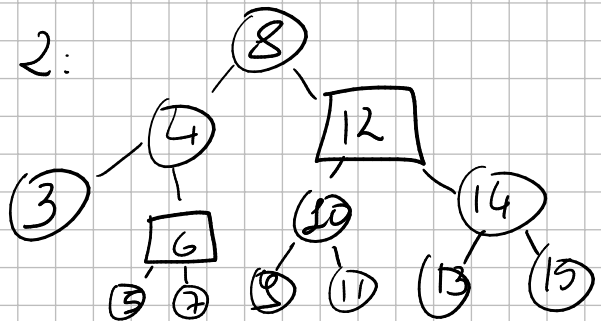




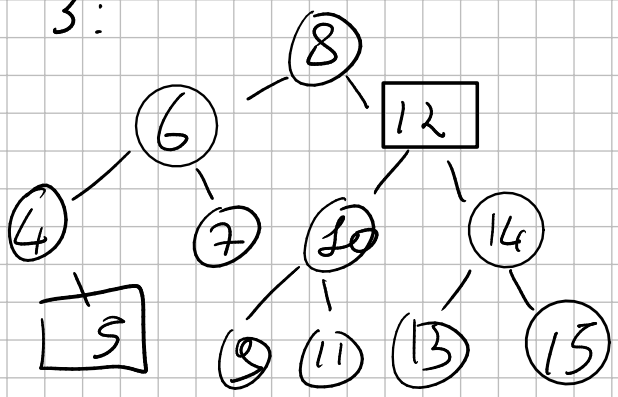
Cancello 1:



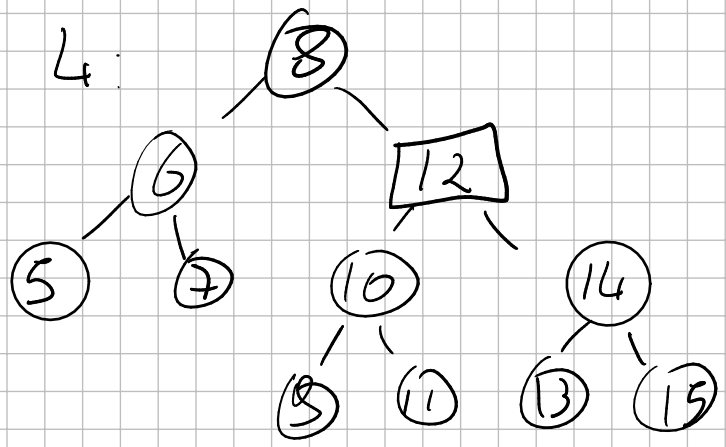
Cancello 2:



Cancello 3:



Cancello 4:



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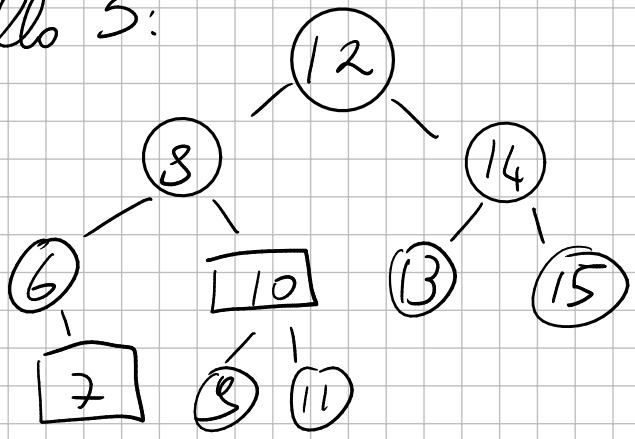

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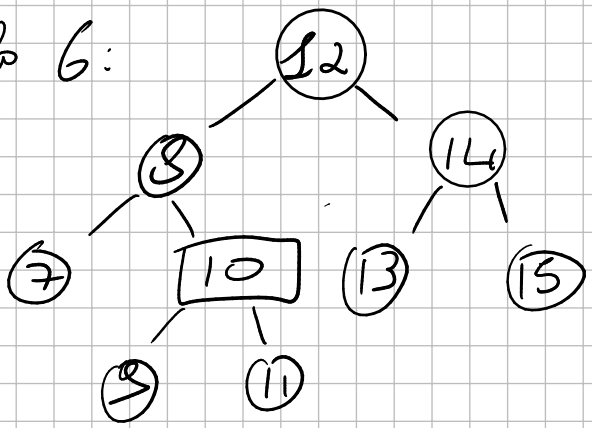

3

Bho

4

```
Bellman-Ford(G, n, s, w):
    d = new array[n]   (accessibile dalla relax)
    pi = new array[n]  (accessibile dalla relax)
O(|V|) FOR v IN G.V DO
        d[v] = +∞
        pi[v] = nil
    END FOR
    d[s] = 0
O(|V|) FOR i=0 TO n-2 DO:
  O(|E|)  FOR (u,v) IN G.E DO:
            Relax(u, v, w)
        END
    END

O(|E|) FOR (u, v) IN G.E DO:
        IF d[u] + w(u,v) < d[v]:
            RETURN FALSE   (ciclo rilevato)
        END
    END
    RETURN TRUE;

RELAX(u, v, w):
    IF d[u] + w(u,v) < d[v]:
        d[v] = d[u] + w(u, v)
        pi[v] = u
```

DIJKSTRA (G, w, n, s)

$O(|V|)$ FOR v IN $G.V$:

$d[v] = +\infty$

$pi[v] = nil$

$d[s] = 0$

$O(|V|)$ $H =$ Build-Min-Heap $(G.V)$

$O(|V|)$ FOR $i=0$ TO $n-1$:

$O(\log(|V|))$ $x = H.$ extract-min $()$

$O(|E|)$ FOR v IN $G.adj(x)$:

$O(\log|V|)$ RELAX(x, v, w); → Richiama increase-key di H che ha $O(\log|V|)$

Bellman-Ford: $O(|V| \cdot |E|)$

DIJKSTRA: $O(|V| \cdot \log(|V|) + O|E| \log(|V|))$