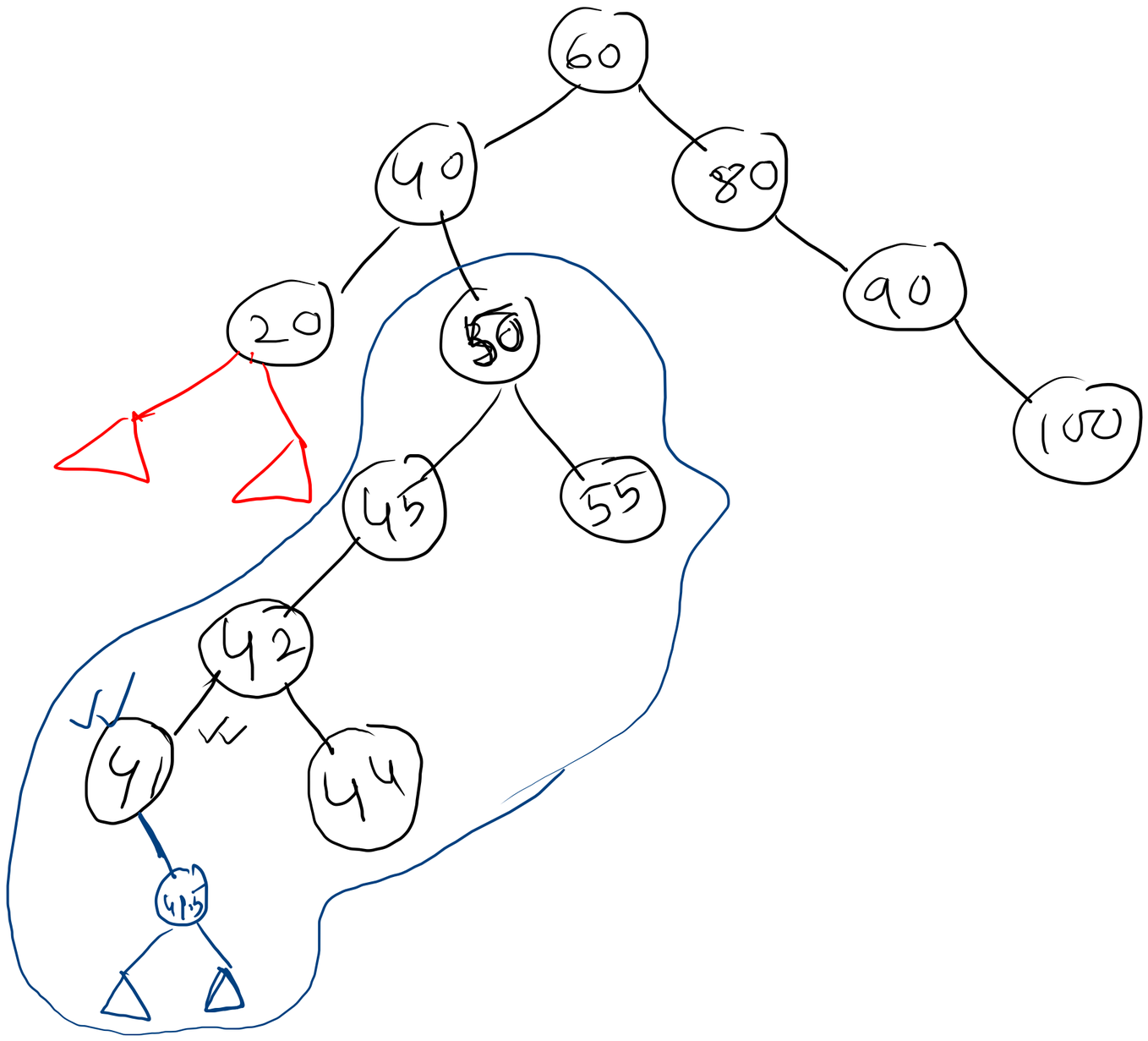
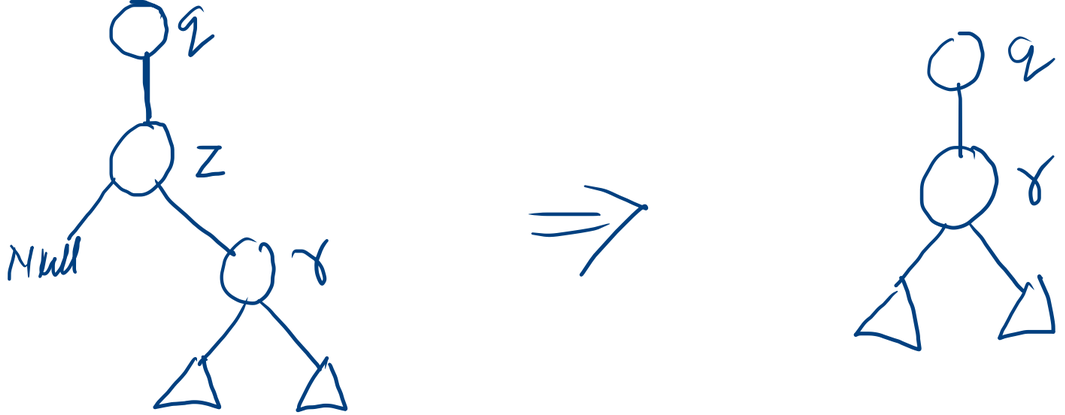
Binary search tree deletion

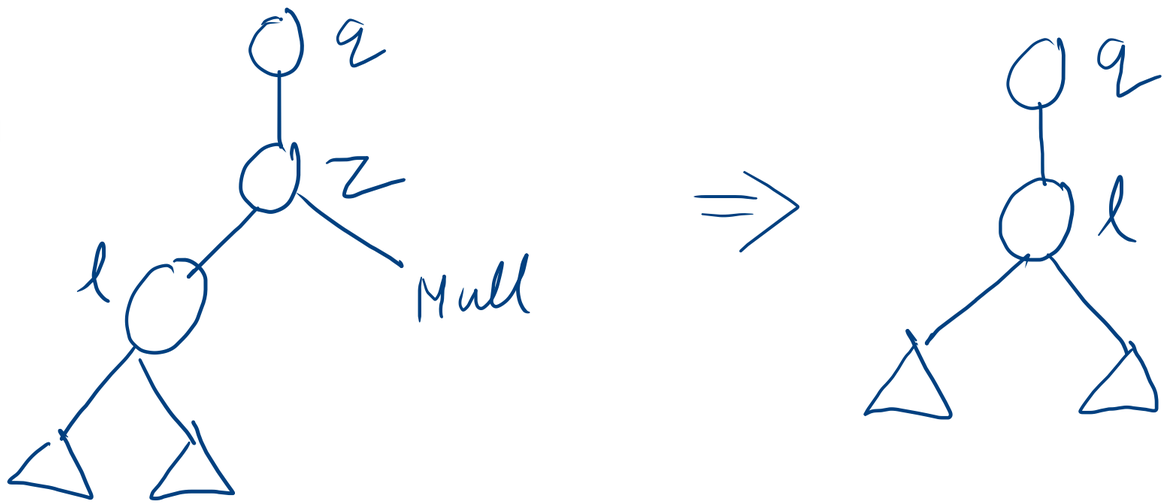
delete - 40



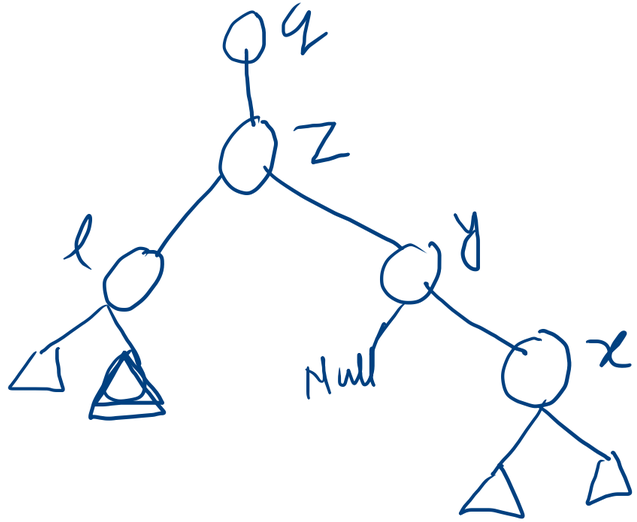
(a)

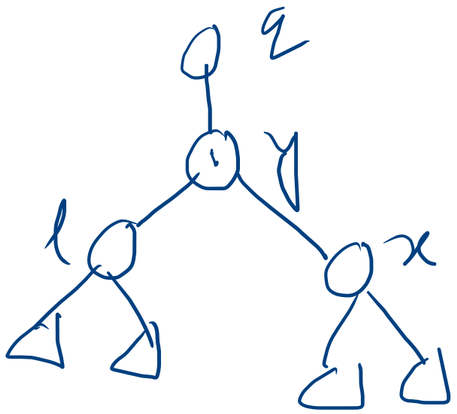


(b)

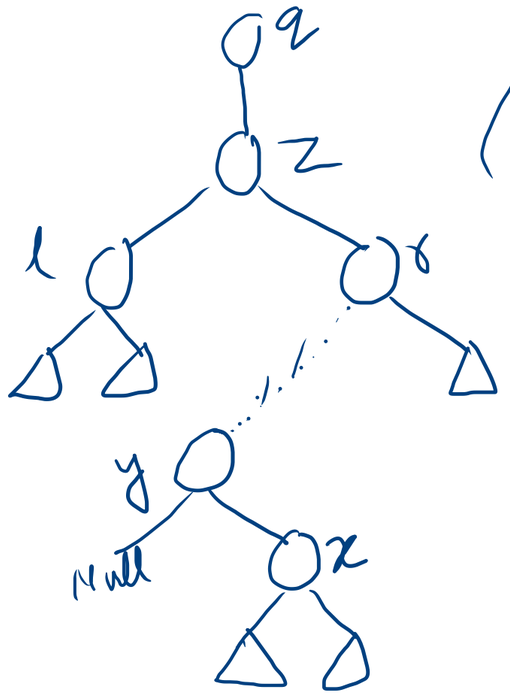


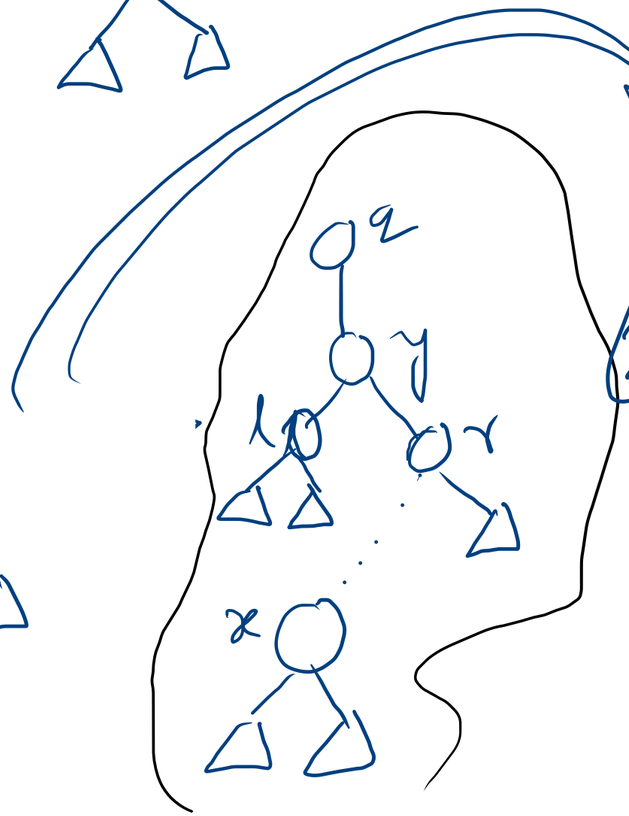
(c)

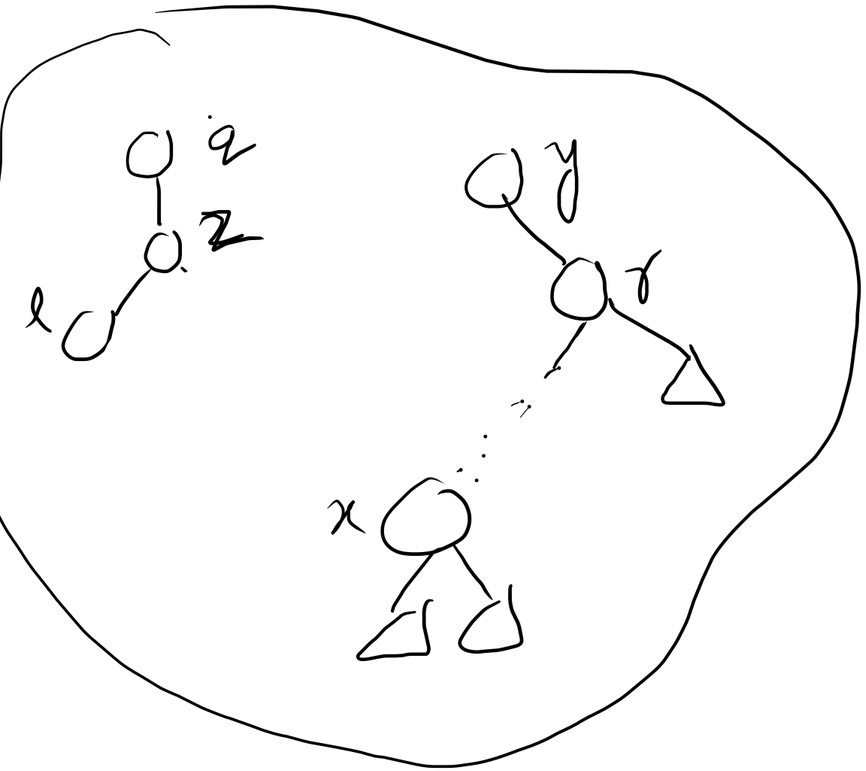




(d)

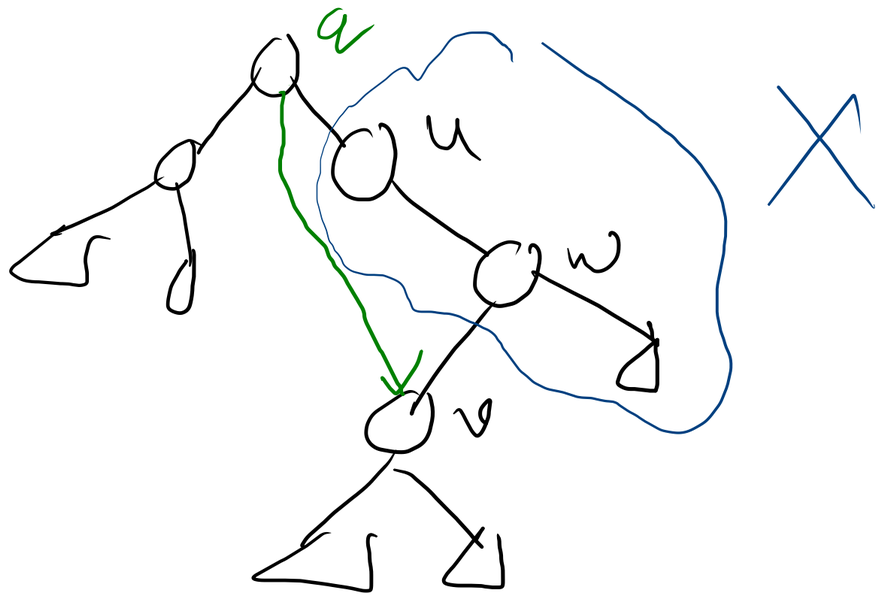


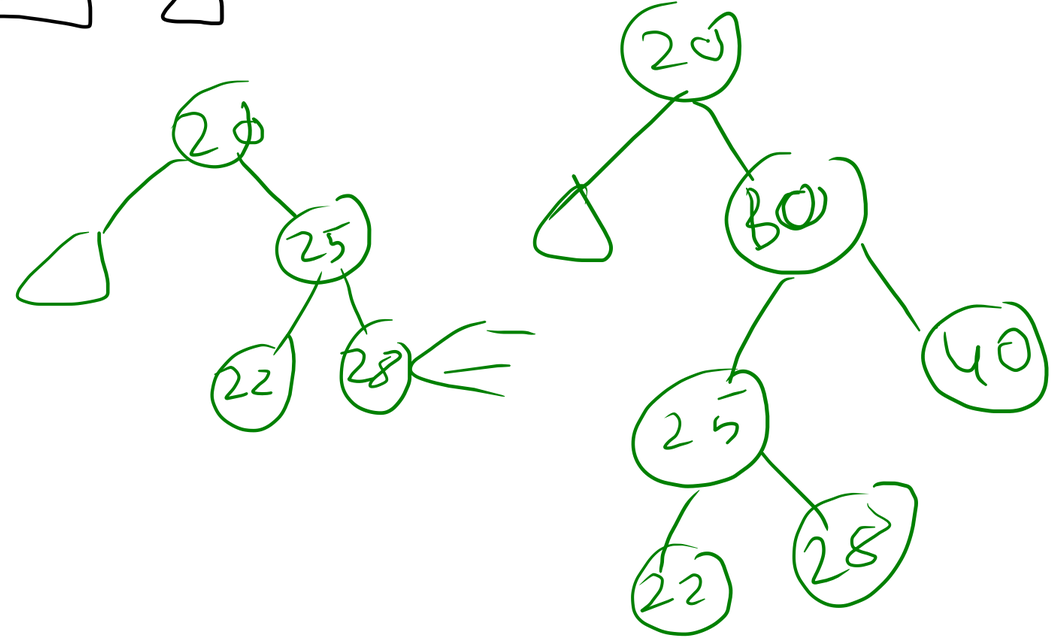




Transplant (T, u, v) $\Rightarrow$ This links u's parent to v.

```
if u.p == Null
        T.root = v
else if u = u.p.left
        u.p.left = v
else
        u.p.right = v
if v ≠ Null
        v.p = u.p
```





```
Tree-deletion ( T, Z)
if Z.left == Null
        Transplant ( T, Z, Z.right)
else if  Z.right == Null
        Transplant (T, Z, Z.left)
 else
        y = Tree-minimum ( T, Z.right)
        if  y ≠ Z.right
          | Transplant ( T, y, y.right)
          | y.right = Z.right
          | y.right.p = y
```

```
Transplant ( T, Z, y)
 y.left = Z.left.
 y.left.p = y
```

running time:

$O(height)$