

① Working answer posted - has extra methods `size()`, `rend()` etc. needed to compile with `Vallikun2.h` (operator-- etc. added) or `BST.h`.

		%8	%7	size
bad	7	7	0	0
bed	11	3	4	1
bid	15	7	1	2
dad	9	1	2	3
fed	15	7	1	4
gag	15	7	1	5

$bid \rightarrow 7+1708=0$
 $fed \rightarrow 7+4708=3 \text{ no go}$
 $\rightarrow 7+9708=0 \text{ no go}$
 $\rightarrow 7+16708=7 \text{ no go}$
 $\rightarrow 7+25708=0 \text{ no go}$
 $\rightarrow 7+36708=3 \text{ no go}$
 $\rightarrow 7+49708=0 \text{ no go}$
 $\rightarrow 7+64708=7 \text{ no go}$
 Endless repeat, even before "gag"

	size
bad	0
bid	1
dad	2
gag	3
bed	4
fed	5

$fed \rightarrow 1+0 \text{ no go}$
 $\rightarrow 1+1=2 \text{ no go}$
 $\rightarrow 1+4=5 \text{ OK}$
 $gag \rightarrow 1+4=5 \text{ no go}$
 $\rightarrow 1+9=3 \text{ OK}$

③ QuickSort with first= pivot rule:

55	50	10	40	80a	90	60	100	70	80b	20
55	50	10	40	20	90	60	100	70	80b	80a
20	50	10	40	55	90	60	100	70	80b	80a
20	10	50	40	90	60	80a	70	80b	100	
10	20	50	40	80b	60	80a	70	90	100	
10	20	40	50	55	70	60	80a	80b		
					60	70	80a	80b		

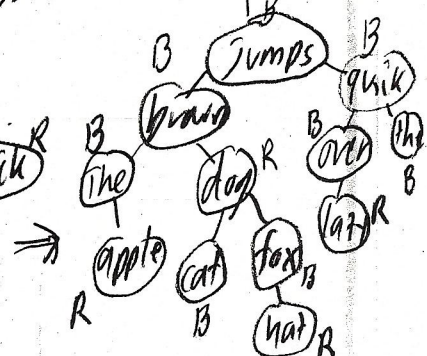
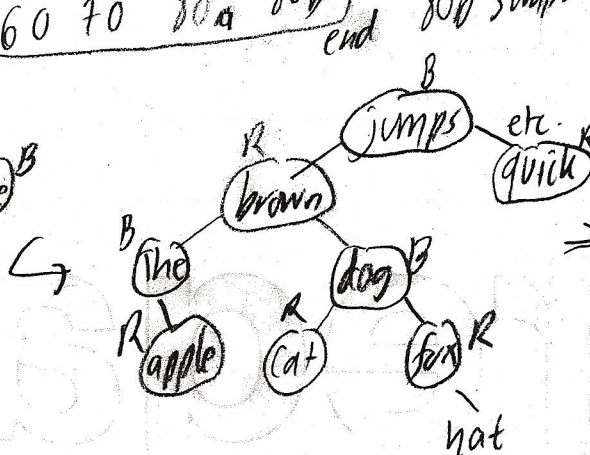
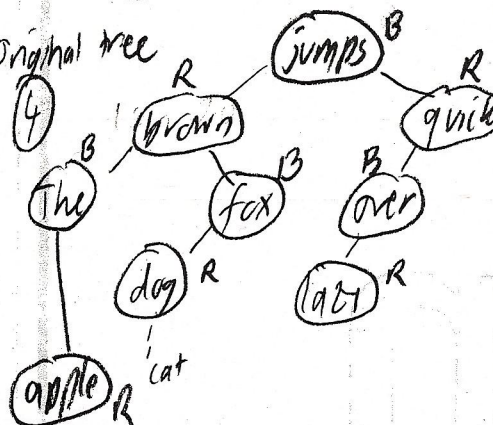
Swap 80b & 20

Iterators meet at 90. Can leave pivot where it is, or swap with 20 - show latter

Iterators meet at 80b, so swap it with 90

Depending on how you treat ties, 80b swaps with 80a or with 70

Original tree



"apple" is immediate to add, as red leaf since parent is black.

The cat, however, needs to be black. Since fox has no right child, this is the absent uncle case. Rotate

Then hat needs to be black too. It gives the Red Uncle Case. Invert colors. This creates a Red uncle with quick. Invert colors again, then color root black. Final tree at right