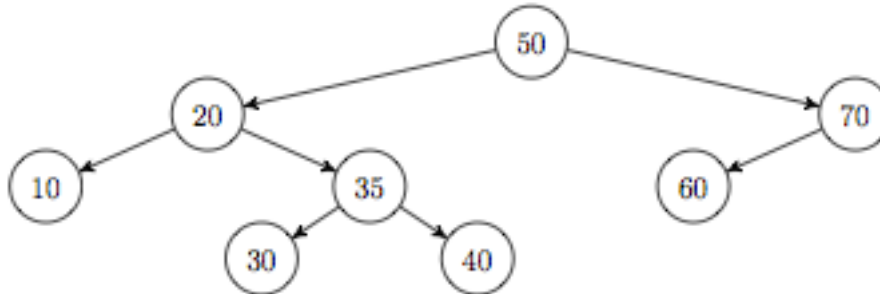


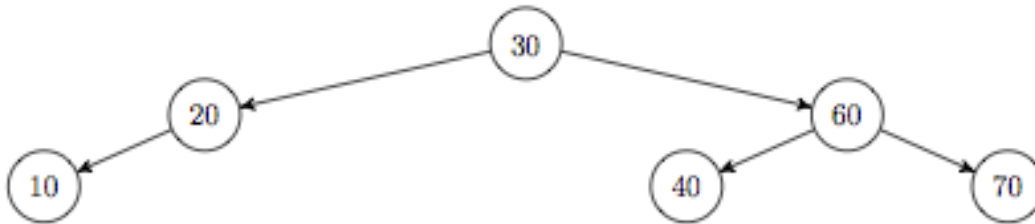
Problem 1

Insert 35 -double rotation



Delete 50 – case 3 two children -double rotation

*** Always select min node in right subtree**



Problem 3

Insert 30: overflow –split –transfer-update

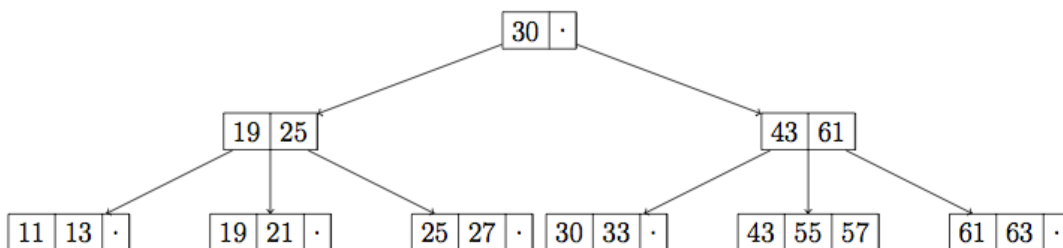


Figure 9: Insert 30

Insert 48 : overflow –transfer –update

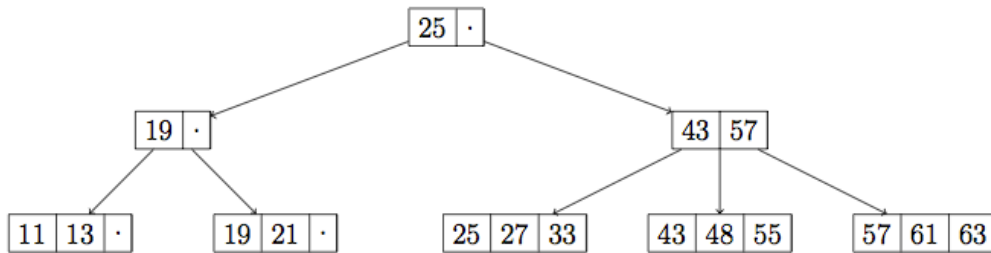


Figure 10: Insert 48

Delete 19: underflow -merge -borrow - update

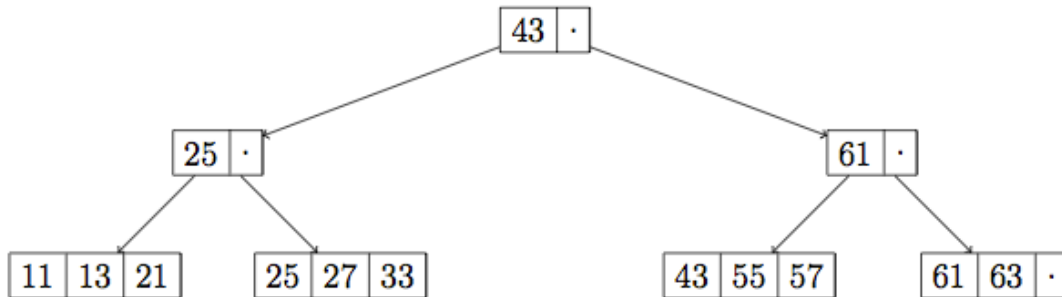


Figure 11: Delete 19

Problem 4

We want to store the following sequence of keys in a hash table: **407, 801, 815, 704, 814, 721, 935**. Draw the result of inserting these keys for each of the following tables:

1. Hash function: Select the last two digits then use division by 7: $h(k) = (k \% 100) \% 7$.
Collision resolution strategy: Linear rehashing with $c = 2$ (Show the number of probes).

Solution

Key	407	801	815	704	814	721	935
H(Key)	0	1	1	4	0	0	0

Index	Key	Probe(s)
0	407	1
1	801	1
2	814	2
3	815	2
4	704	1
5	935	7
6	721	4

probes = Number of
inspected cells

% 7 --> 7 cells for the
address area

2.

3. Hash function: $h(k) = (3 \times (k \% 100)) \% 7$. Collision resolution strategy: coalesced chaining with a cellular size of 2 (Show clearly the links and the final location of epla).

Key	407	801	815	704	814	721	935
H(Key)	0	3	3	5	0	0	0

Index	Key
0	407
1	
2	epla
3	801
4	935
5	704
6	721
7	814
8	815

