2-3 Trees
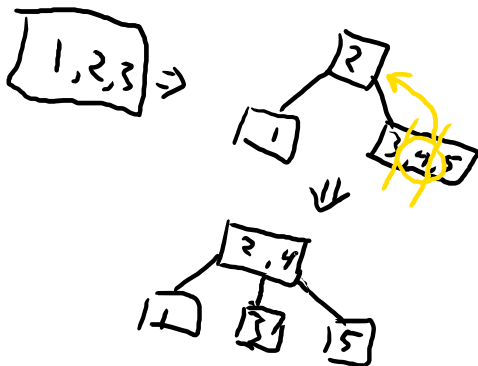
Exercises

Insertion (no key rotations!)

Starting with an empty tree, insert elements in the following order:
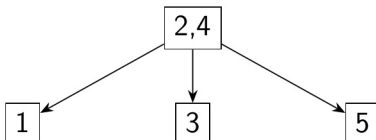1, 2, 3, 4, 5

Insertion

Starting with an empty tree, insert elements in the following order:
`1, 2, 3, 4, 5`

Insertion

(STILL NO ROTATIONS YET)

Starting with an empty tree, insert elements in the following order:

~~36~~, ~~72~~, ~~8~~, ~~48~~, ~~60~~, ~~75~~

45
66
72

$$8, 36, 72 \Rightarrow$$

```
    36
   /    \
  8    45,72
```

$$\Rightarrow$$

```
      36
     /    \
    8    45,66,72
```

!!!

```
       36,66
      /    |    \
     8    45   72,75
```
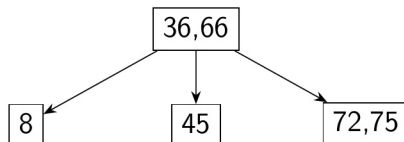
Insertion

Starting with an empty tree, insert elements in the following order:
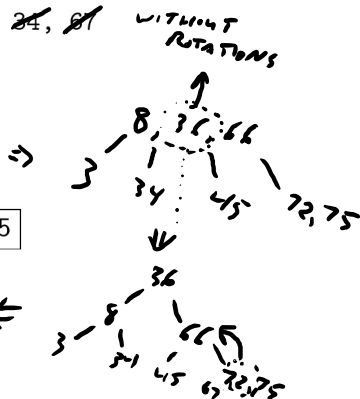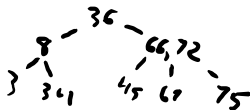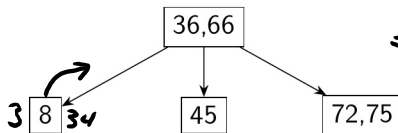36, 72, 8, 45, 66, 75

Insertion

Starting with an empty tree, insert elements in the following order:
36 , 72 , 8 , 45 , 66 , 75
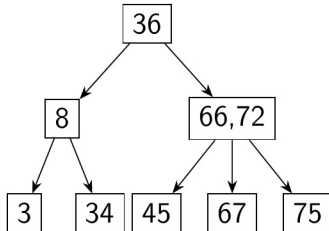Now add the following elements: ~~8~~, ~~34~~, ~~67~~

Insertion

Starting with an empty tree, insert elements in the following order:
36, 72, 8, 45, 66, 75
Now add the following elements: 3, 34, 67

Insertion with Key Rotation

Starting with an empty tree, insert elements in the following order:
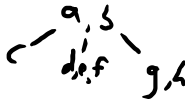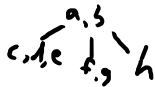
~~1~~, ~~2~~, ~~3~~, ~~4~~, 5

Insertion with Key Rotation

Starting with an empty tree, insert elements in the following order:
1, 2, 3, 4, 5

Insertion with Key Rotation

a,b
c,d,e   f,g   h

a,b
c   d,e,f   g,h

Starting with an empty tree, insert elements in the following order:
36, 72, 8, 45, 66, 75

8, 36, 72 →
36
8   45, 66, 72
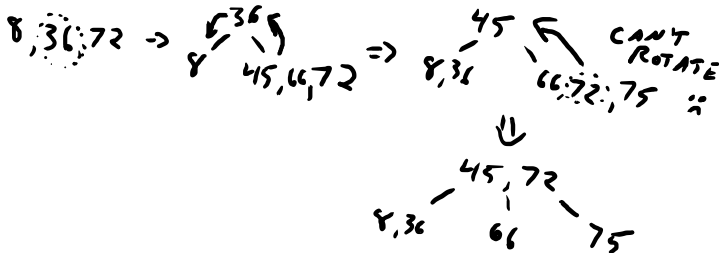=>
45
8, 36   66, 72, 75   CAN'T ROTATE ?

⇓

45, 72
8, 36   66   75

Insertion with Key Rotation

Starting with an empty tree, insert elements in the following order:
36, 72, 8, 45, 66, 75

Insertion with Key Rotation

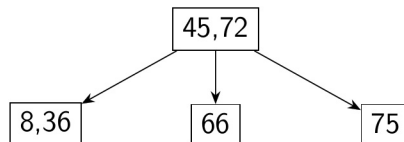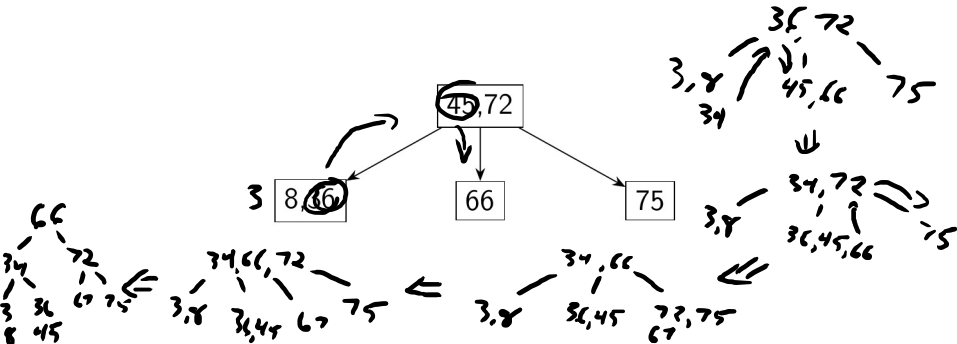Starting with an empty tree, insert elements in the following order:

36, 72, 8, 45, 66, 75

Now add the following elements: ~~8~~, ~~34~~, 67
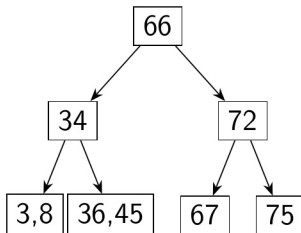
Insertion with Key Rotation

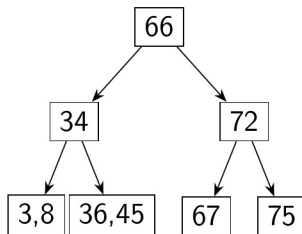Starting with an empty tree, insert elements in the following order:
36, 72, 8, 45, 66, 75
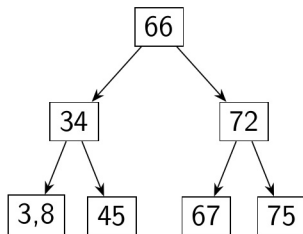Now add the following elements: 3, 34, 67

Deletion

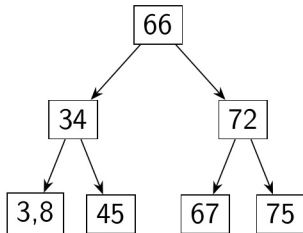Starting with the previous tree, delete 36

Deletion

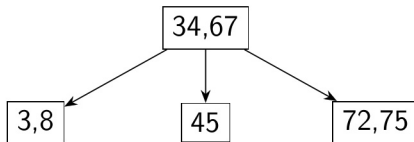Starting with the previous tree, delete 36

Deletion

Starting with the previous tree, delete 36
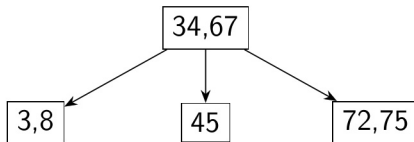And then delete 66

Deletion

Starting with the previous tree, delete 36
And then delete 66

Deletion

Starting with the previous tree, delete 36
And then delete 66, and 45

Deletion

Starting with the previous tree, delete 36
And then delete 66, and 45