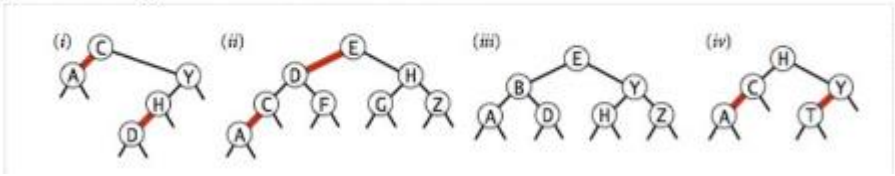
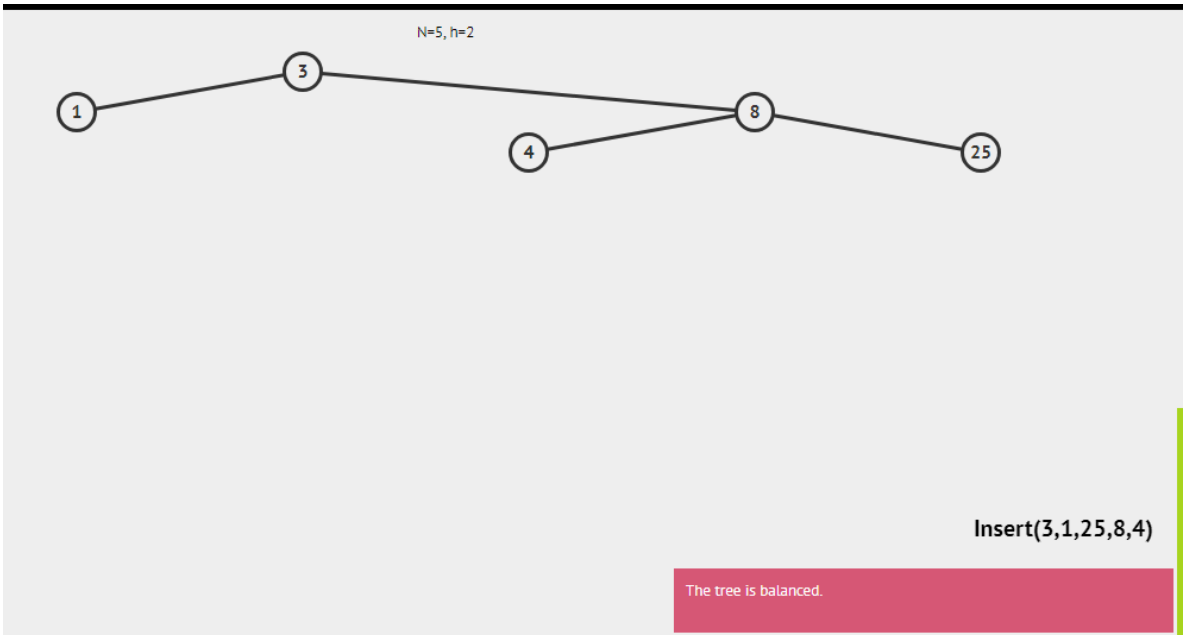
ANDERSSON DAVID SÁNCHEZ MÉNDEZ

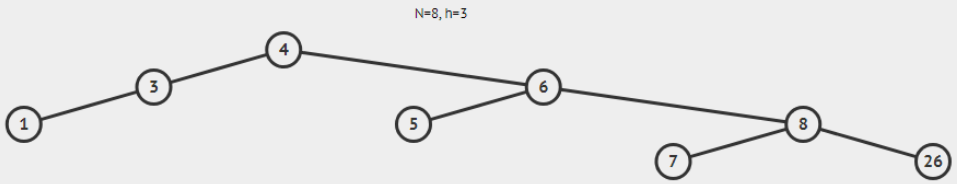
CONTROL LECTURA ÁRBOLES BINARIOS

1. ¿Cuál de los siguientes árboles son red-black BSTs?





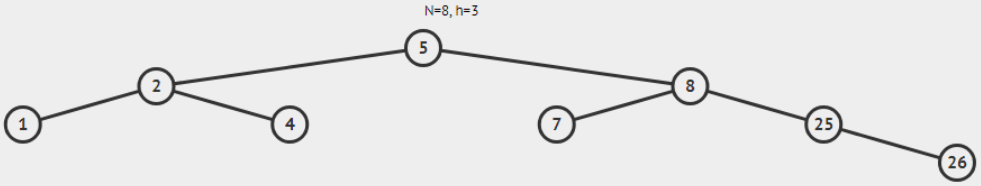

```
insert v
check balance factor of this and its children
  case1: this.rotateRight
  case2: this.left.rotateLeft, this.rotateRight
  case3: this.rotateLeft
  case4: this.right.rotateRight, this.rotateLeft
  this is balanced
```



Insert(5,4,3,6,1,8,7,26)

The tree is balanced.

```
insert v
check balance factor of this and its children
  case1: this.rotateRight
  case2: this.left.rotateLeft, this.rotateRight
  case3: this.rotateLeft
  case4: this.right.rotateRight, this.rotateLeft
  this is balanced
```

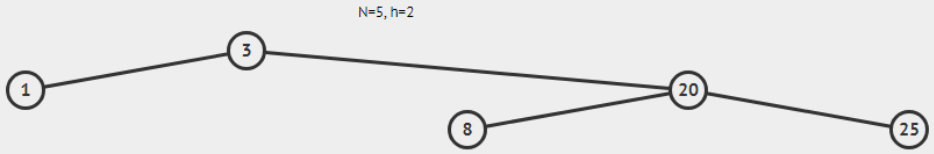


Insert(5,2,1,4,25,8,7,26)

The tree is balanced.

```
insert v
check balance factor of this and its children
  case1: this.rotateRight
  case2: this.left.rotateLeft, this.rotateRight
  case3: this.rotateLeft
  case4: this.right.rotateRight, this.rotateLeft
  this is balanced
```

>



Insert(8,3,1,25,20)

<

The tree is balanced.

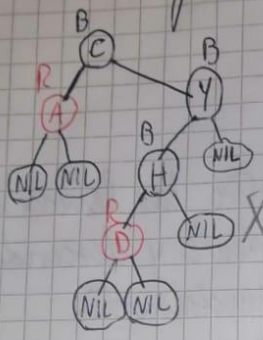

```
insert v
check balance factor of this and its children
  case1: this.rotateRight
  case2: this.left.rotateLeft, this.rotateRight
  case3: this.rotateLeft
  case4: this.right.rotateRight, this.rotateLeft
  this is balanced
```

>

CONTROL LECTURA BINARY TREE

1) ¿Cuál de los siguientes árboles son red-black BSTs?

(i)



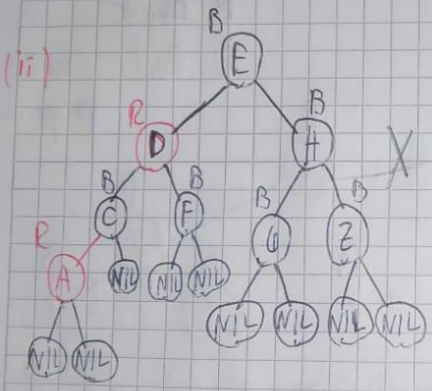
X

No cumple propiedad

4. Todas las rutas desde la raíz a las hojas vacías (None) debe pasar por el mismo número de nodos negros.

→ NO ES R-B BSTs

(ii)

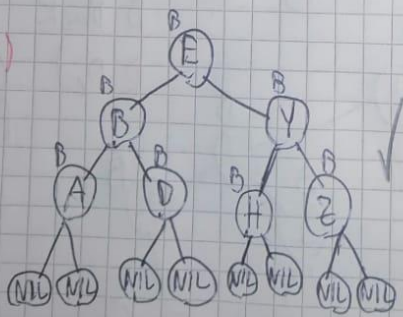


X

No cumple propiedad 4

Por lo tanto no es R-B BSTs

(iii)

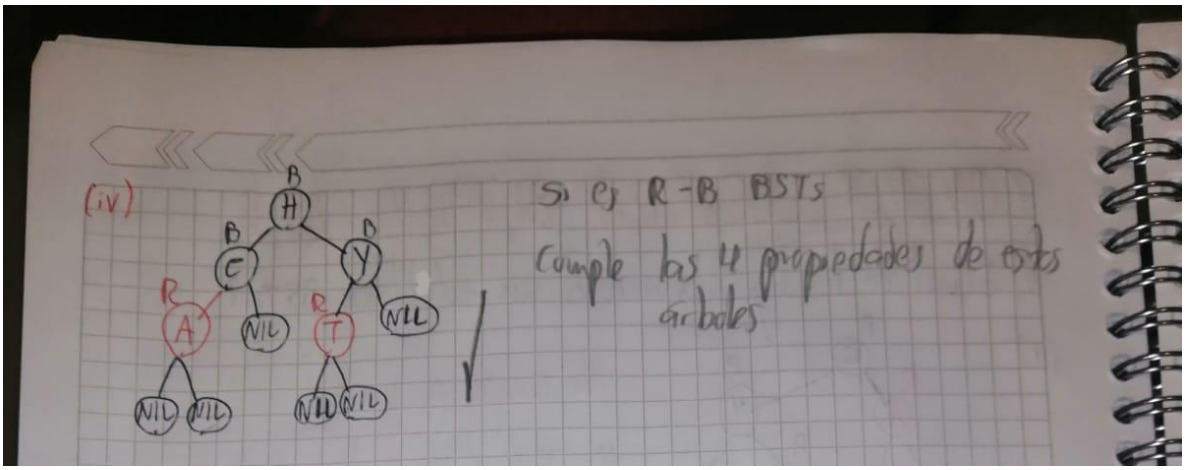


✓

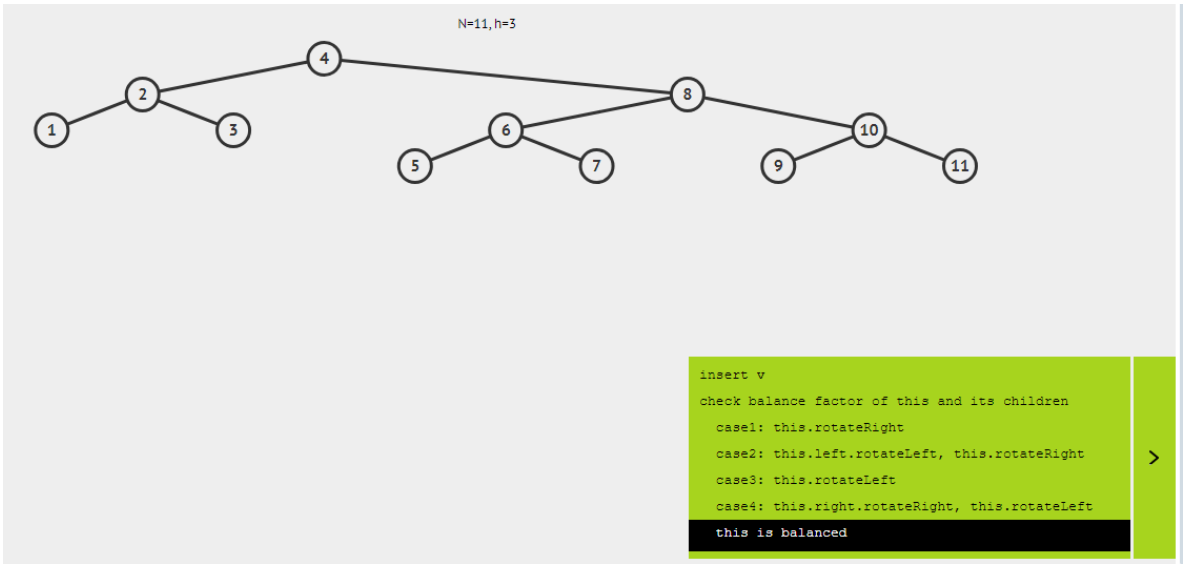
Sí es R-B BSTs

Cumples las propiedades

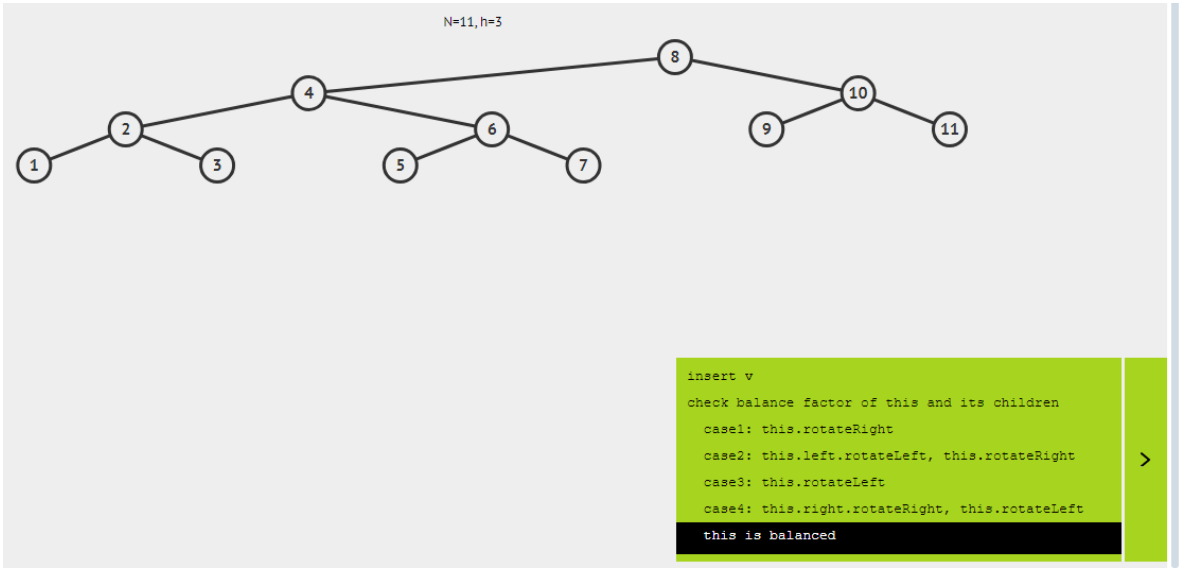
1) Nodo rojo o negro
2) Raíz cola negro
3) Nodos rojos NO consecutivamente.
4) ...

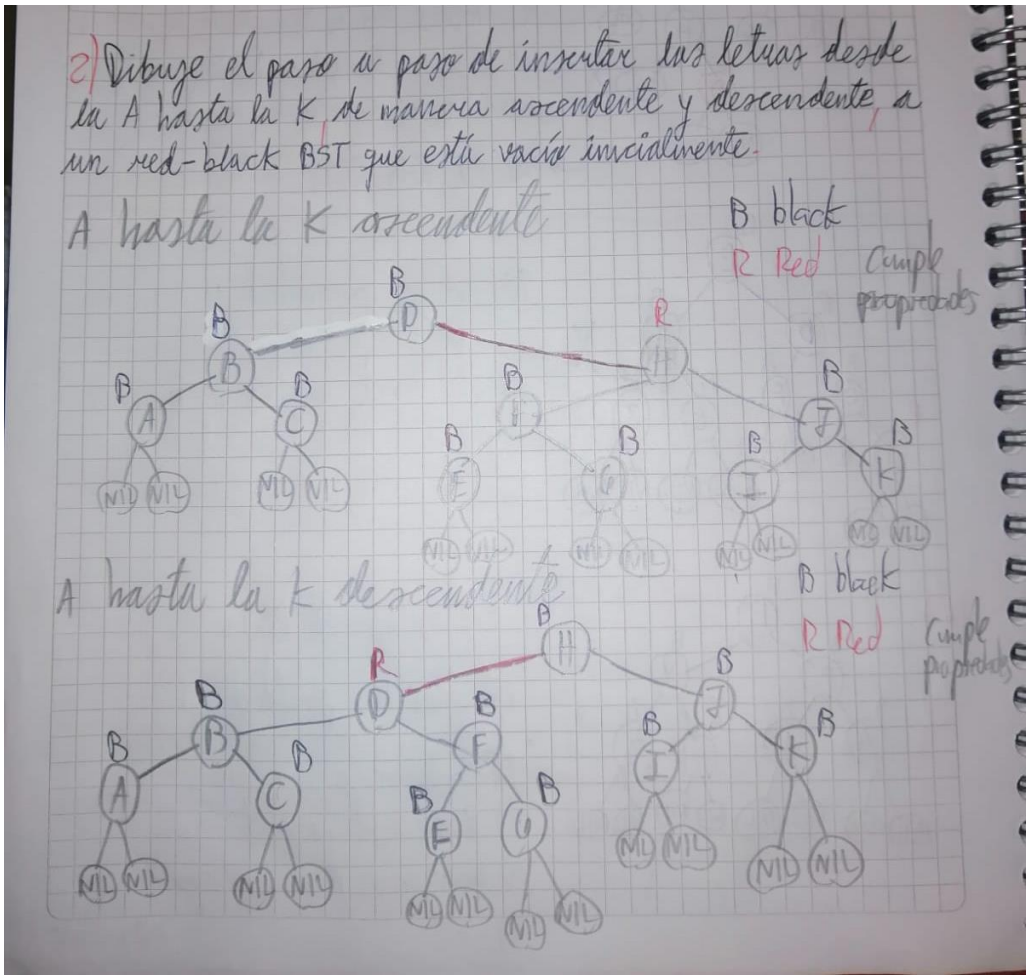


2. Dibuje el paso a paso de insertar las letras desde la A hasta la K, de manera ascendente y descendente, a un red-black BST que está vacío inicialmente.

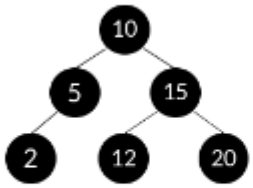


Números representan letras

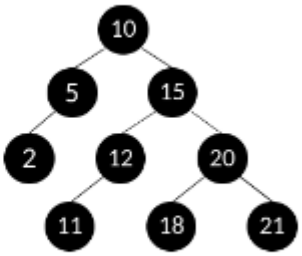

N=11, h=3
8
4
10
2
6
9
11
1
3
5
7
insert v
check balance factor of this and its children
case1: this.rotateRight
case2: this.left.rotateLeft, this.rotateRight
case3: this.rotateLeft
case4: this.right.rotateRight, this.rotateLeft
this is balanced
>


2) Dibuje el paso a paso de insertar las letras desde la A hasta la K de manera ascendente y descendente, a un red-black BST que está vacía inicialmente.
A hasta la K ascendente
B black
R Red
Cumple propiedades
A hasta la K descendente
B black
R Red
Cumple propiedades

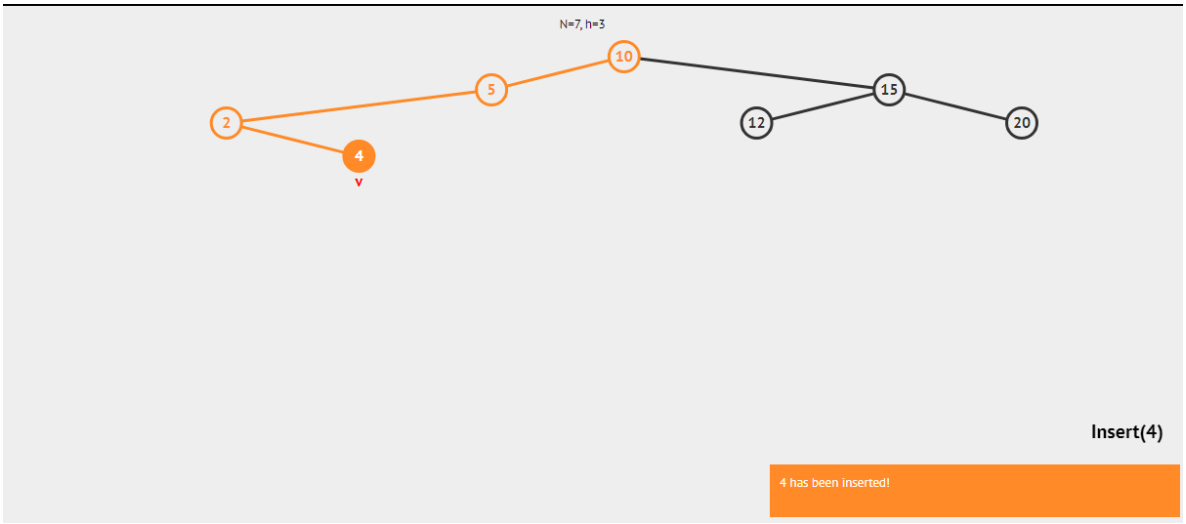
3. Dibuje el árbol AVL resultante al aplicar las siguientes operaciones:



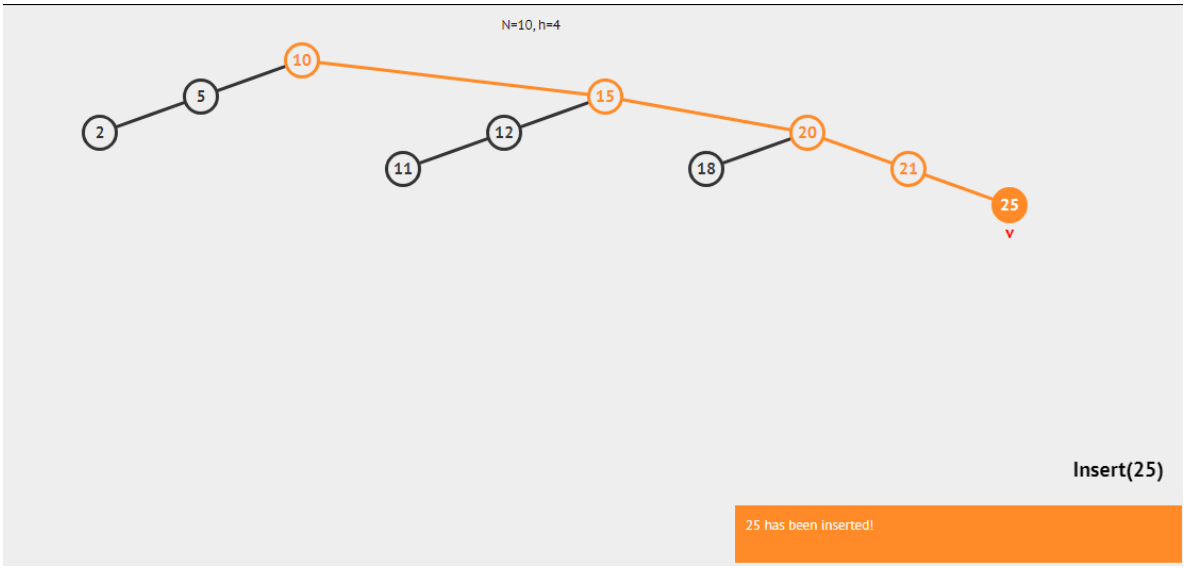
$insert(4)$



$insert(25)$




```
if insertion point is found
  create new vertex
if value to be inserted < this key
  go left
else if value to be inserted > this key
  go right
else increment frequency
```




```
if insertion point is found
  create new vertex
if value to be inserted < this key
  go left
else if value to be inserted > this key
  go right
else increment frequency
```

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