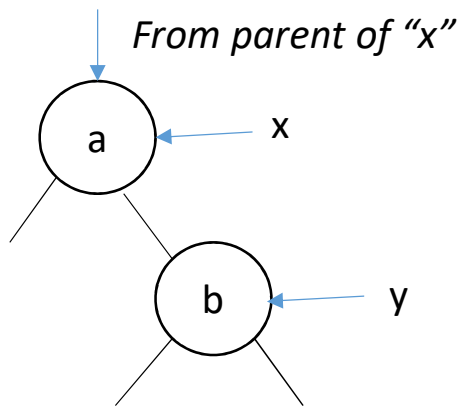


Node Structure

Left	Parent	Data	Right
------	--------	------	-------

Example:
x.Left = y
y.Parent = x



```

y=x.right
x.right= y.left      [check β]
y.left.parent=x     [node structure]
y.parent=x.parent
If(x.parent=NULL) then
    T.root=y
else
    if(x=x.parent.left)
        x.parent.left=y
    else
        x.parent.right=y
y.left=x
x.parent=y

```

Change left=right and right=left to perform

Part-1: To find the location of insertion.
 Part-2: To change the colour of nodes [if required]

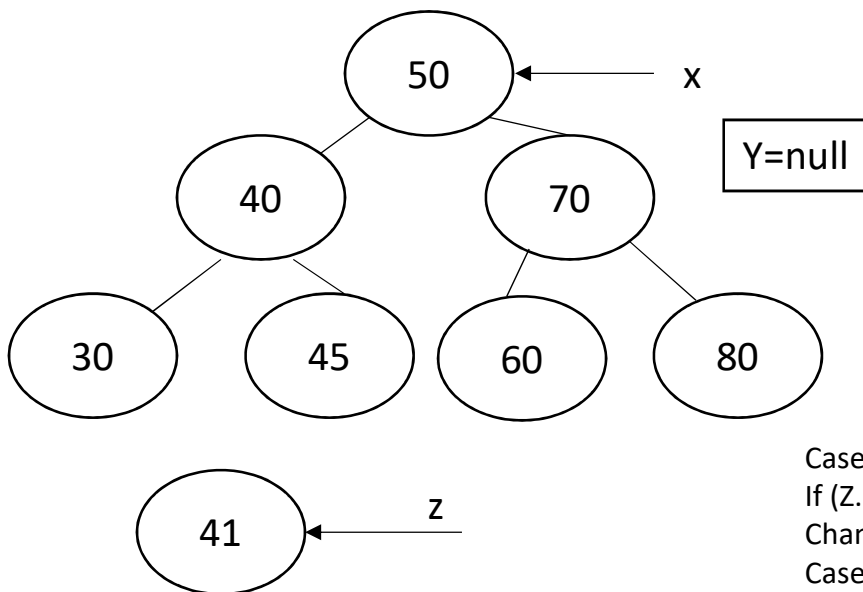
Let "Z" be the node to be inserted.

Z.Left=NULL

Z.Right=NULL

Z.Colour=Red

Now it is required to traverse the tree from "root" and find the suitable position for Inserting node "Z" in the tree.



Case – 1: Dependent on Colour of Sibling of parent [UNCLE]

If (Z.U = Red)

Change the Colour of Z.P, Z.U and Z.GP

Case – 2:

Z.U = Black and new node "Z" makes a triangle with Z.P, Z.U and Z

Rotate Z.P in opposite direction

Case – 3:

Z.U = Black and new node "Z" makes a line between Z.P, Z

Rotate Z.GP in opposite direction

Exchange the colours of Grand Parent and Parent.

```

While (x != null) do
{
  y=x //change y before changing x
  if(z.data < x.data)
  {
    x = x.left
  }
  else
  {
    x =x.right
  }
  z.parent=y
  if(y=null) // no tree exist
  {
    t.root=z
  }
  if(z.data < y.data)
  {
    y.left=z
  }
  else
  {
    y.right=z
  }
}
  
```

--- Node "Z" pointers are initialized, as above

```

while (Colour[p[z]] = Red) do
{
  if (p[z] = left(p[p[z]]) then
  { Case 1
    y = right[p[p[z]]] //Mark y as uncle
    if(colour[y]=red) then //recolour
    {
      colour[p[z]] = Black
      colour[y] = Black
      colour[p[p[z]]] = Red
      z=p[p[z]]
    } //Case 2
  } else
  {
    if (z=right[p[z]]) then
    {
      z = p[z]
      Left-rotate(T,z)
    } Case 3
    colour[p[z]] = Black
    colour[p[p[z]]] = Red
    Right-rotate(T, p[p[z]])
  }
  else [Same only interchange right-left]
}
Again while loop is checked, if false
Colour[root[T]] = Black
//End of algorithm

```