CS35, Fall 2014
Swarthmore College
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Pseudocode for AVL Balanced Binary Search Tree Methods

Balance a sub-tree

Note: the following code does not account for empty child sub-trees. You should check for `NULL` *pointers when accessing* `left` *or* `right` *or* `height`*. Primarily, when calculating heights of children.*

```
function BALANCE($current$)
    if $current$ == NULL then    \\Nothing to balance
        return current
    end if

    COMPUTEHEIGHTFROMCHILDREN($current$)    \\update current's height

    $leftH = current \to left \to height$
    $rightH = current \to right \to height$

    if $leftH > rightH + 1$ then             \\Left subtree is too tall
        $leftleftH = current \to left \to left \to height$
        $leftrightH = current \to left \to right \to height$

        if $leftleftH >= leftrightH$ then
            return RIGHTROTATE($current$)           \\left-outer grandchild is taller
        else
            return LEFTRIGHTROTATE($current$)       \\left-inner grandchild is taller
        end if
    end if

    if $rightH > leftH + 1$ then             \\Right subtree is too tall
        $rightleftH = current \to right \to left \to height$
        $rightrightH = current \to right \to right \to height$

        if $rightrightH >= rightleftH$ then
            return LEFTROTATE($current$)            \\right-outer grandchild is taller
        else
            return RIGHTLEFTROTATE($current$)       \\right-inner grandchild is taller
        end if
    end if

    return $current$    \\No rotation, so root is the same
end function
```

```
function RIGHTROTATE($current$)
    $newRoot = current \rightarrow left$
    $current \rightarrow left = newRoot \rightarrow right$
    $newRoot \rightarrow right = current$
    $computeHeightFromChildren(current)$
    $computeHeightFromChildren(newRoot)$
    return $newRoot$
end function
```

```
function LEFTRIGHTROTATE($current$)
    $current \rightarrow left = leftRotate(current \rightarrow left)$
    return $rightRotate(current)$
end function
```

```
function COMPUTEHEIGHTFROMCHILDREN($current$)
    $leftH = current \rightarrow left \rightarrow height$
    $rightH = current \rightarrow right \rightarrow height$
    $height = 1 + max(leftH, rightH)$
end function
```