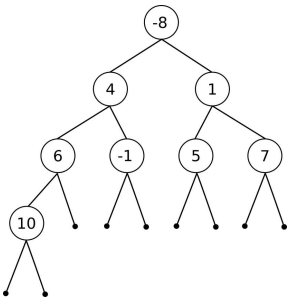
Binary Trees

Given an implementation of a `BinaryTree`, write a class `MyBinaryTree` that extends the given class and that can solely store `int` elements.

We define the **sum of a tree** as the **sum of the values of all elements stored within nodes**. Likewise, the **sum of a path** is the sum of the values of all nodes along that path.

Since we also allow negative values to be stored within nodes, shorter paths or subtrees may actually have a higher sum.



Implement the four python methods

- ```
  def height(self) -> int:
  ```

  that calculates the **height** of a given (sub-)tree (start from the node reference, do not look for the root first!)

- ```
  def max_sum(self) -> int:
  ```

  that calculates the sum of the maximal child-tree. For this you first have to calculate the sum of the left and the right subtree (starting from `self`). The method should return the maximum of the two sums.

  In the example above, `max_sum()` $= \mathbf{max\{4+6-1+10, 1+5+7\} = 13}$, if you call this method on the node containing -8.

  The sum of an empty subtree is 0.

- ```
  def max_path(self) -> int:
  ```

  that finds the maximal path, starting from the root to any of the tree's leaves. Starting from the node containing -8 `max_path()` $= -8+4+6+10 = 12$.

- ```
  def max_width(self) -> int:
  ```

  that for any given (sub-)tree calculates the maximum width of that tree (i.e. the maximum number of nodes on the same level).

  The following binary tree has a maximum width of 3. To solve this problem, it is helpful to use a `list` that holds elements of the type `MyBinaryTree`.

Note: There is a `visualize()` function to display the binary tree in the class `BinaryTree`. Because `MyBinaryTree` inherits from `BinaryTree`, you can also call it on your instances of `MyBinaryTree` in your solution. This might help you debugging your implementation. To use it, you have to do the following steps. 1. Install the Graphviz package via pip: `pip install graphviz` 2. Download and install Graphviz from the official website for your OS: https://www.graphviz.org/download/