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**1.** Choose the appropriate running time from the list below.

The variable $n$ represents the number of items (keys, data, or key/data pairs) in the structure. In answering this question you should assume the best possible implementation given the constraints, and also assume that every array is sufficiently large to handle all items (unless otherwise stated).

Perform a level-order traversal of a Binary Tree.

A. $O(n \log n)$
B. $O(1)$
C. $O(n^2)$
D. $O(\log n)$
E. [Correct Answer] [Your Answer] $O(n)$

**2.** Choose the appropriate running time from the list below. The variable $n$ represents the number of items (keys, data, or key/data pairs) in the structure and $h$ represents the height of the tree. In answering this question you should assume the best possible implementation given the constraints, and also assume that every array is sufficiently large to handle all items (unless otherwise stated).

Find the minimum key in a Binary Tree

A. None of the options is correct.
B. [Correct Answer] [Your Answer] $O(n)$
C. $O(1)$
D. $O(n^2)$
E. $O(h)$

**3.** Fill in the blanks so that the following sentence is true: If you have a complete tree with 17 nodes, the maximum height ($h$) of the tree is _____ and there are _____ nodes on level $h$.

A. First blank is 4, second is 1.
B. First blank is 8, second is 9.
C. [Your Answer] First blank is 5, second is 2.
D. First blank is 8, second is 2.
E. [Correct Answer] None of the other options makes the sentence true.

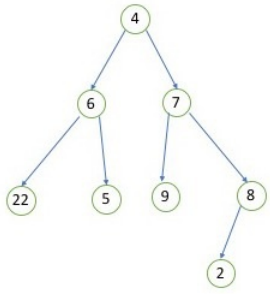
**4.** Consider the binary tree class described in lecture where we have 1) variable `root` that is the `treeNode` representing the root of the binary tree and 2) each `treeNode` consists of an integer `data` element, and two `treeNode` pointers called `left` and `right`.

What does fun(`root`) return?

```
int fun(treeNode * curr) {
   if (curr != null) {
      ret1 = fun(curr->left);
      ret2 = fun(curr->right);
      return 1 + ret1 + ret2;
   }
   else return 0;
}
```

A. `fun` returns the sum of all elements in the tree.
B. `fun` returns the height of the tree.
C. None of the other options is correct.
D. `fun` returns the shortest distance from root to leaf.
E. [Correct Answer] [Your Answer] `fun` returns the number of elements in the tree.

**5.** What is the In-order traversal of the binary tree given below?




A. `22 5 6 9 2 8 7 4`
B. [Correct Answer] [Your Answer] `22 6 5 4 9 7 2 8`
C. `4 6 7 22 5 9 8 2`
D. `4 6 22 5 7 9 8 2`
E. None of the options is correct