ECE368 Fall 2016 Homework 5

IMPORTANT:

- Do NOT leave your name or Purdue ID on this homework.
- Write your homework security number at the TOP of EACH page.

Read and sign the ***Academic Honesty Statement*** that follows:

"In signing this statement, I hereby certify that the work on this exercise is my own and that I have not copied the work of any other student while completing it. I understand that, if I fail to honor this agreement, I will receive a score of zero for this exercise and will be subject to further disciplinary action."

`Homework security number:`

Please acknowledge any people who have helped you with this homework.

Question	Credits
1	
2	
3	

1. (20 points) Draw a binary tree to illustrate the recursion calls involved in the execution of the routine `Fibonacci(4)`. Every node in this binary tree should be labeled `Fibonacci(i)` to represent a recursion call with parameter *i*. Hence, the root node of this binary tree should be labeled `Fibonacci(4)`.

```
Fibonacci(n)
 if (n == 0) or (n == 1) {
     return n
 }
 else {
     return Fibonacci(n-1) + Fibonacci(n-2)
 }
```

2. (40 points) A binary tree is a strict binary tree if *every* node in the tree has either zero children or two children (*i*.e., no node can have only one child). Write the pseudo-code for a recursive function `is_strict_binary()` that can be used to determine if a given binary tree is a strict binary tree. The function accepts one parameter, which is a pointer to the node currently under consideration as rooting a sub-tree. The function returns `TRUE` if the sub-tree rooted at this node is a strict binary tree, or `FALSE` otherwise. The function will be called by the user by using a pointer to the root node of the tree as a parameter.

3. (40 points) Prove that for a strictly binary tree with `N` leaf nodes, there are altogether `2N-1` nodes in the tree. (Hint: Can you do this using mathematical induction?)