Name: _____

CS 161 Week 9 Worksheet:

Recursion

1. Explain these terms:
   - Iteration
   - Recursion
   - Base case
   - Recursive step
   - Recursive call

2. Trace the following code. What will each piece of code do or print? (Show your work)

```
1) int a(int i) {
       return i + a(i - 1);
   }
   cout << a(4) << endl;
```

```
2) int b(int i) {
       if (i == 0)
         return 1;
       return i * b(i - 1);
   }
   cout << b(4) << endl;
```

3. Write a print_to_zero(int i) function that prints from i down to 0 **iteratively** (with a loop).

```
void print_to_zero(int i) {

}
```

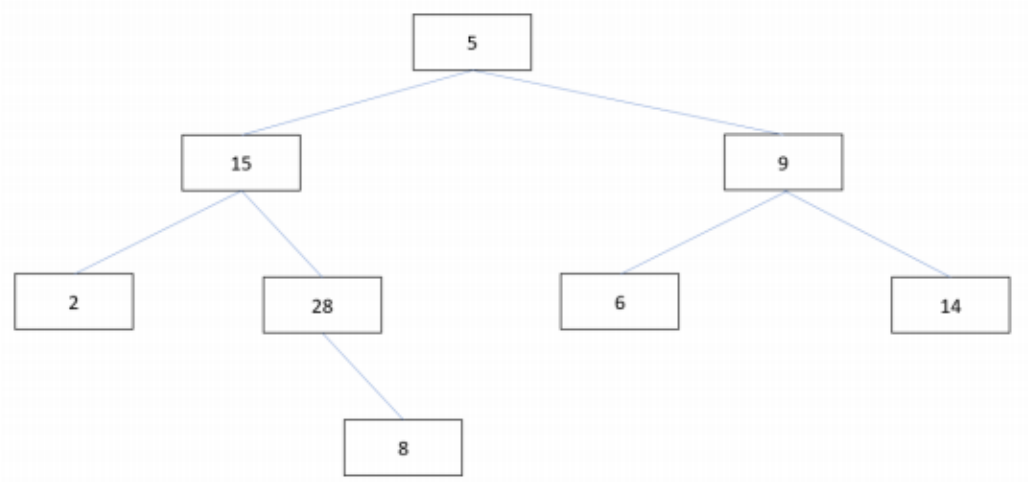
4. Write a print_to_zero(int i) function that prints from i down to 0 **recursively**.

```
void print_to_zero(int i) {




}
```

5. See if you can figure out what the following recursive algorithm (defined using **pseudocode)** will print when applied to this binary tree, starting with the top box that contains "5". (Don't be intimidated, try tracing through the algorithm)




```
printValue(box x)
     if box x does not exist
          return /* (Don't print anything) */
     printValue(x's left child)
     Print: Value inside box x
     printValue(x's right child)
```

6. Think of different ways you could arrange the last three lines in the recursive algorithm above and how does it change the order of the values printed.