COSC201 ~ 11/07/2011

Recursion (Chapter 7)

◁ Rules of Recursion

1. You <u>must</u> have a <u>Base Case</u> (required!)
2. Make progress
   ↳ each time you make a recursive call it should be moving you toward the solution
3. You gotta believe!
4. Compound interest rule
   ↳ Don't duplicate work... recursion is meant to be efficient

◁ Classic Recursive Fibonacci

```
public int fib (int n){
    if(n==1)
      return 1;
    return fib(n-1) + fib(n-2)
}
```

violates the compound interest rule! — calculates the same thing multiple times

◁ A Solution that does not violate the compound interest rule

```
private int fib (int n, int a, int b){
    if(n==1) { return b; }
    n=n-1;
    int temp=a;
    a=b;
    b=a+temp;
    return fib(n,a,b); }
```

★ iterative solution disguised as a recursive solution

```
public int fib(int n) {
    if(n==0 || n==1)
      return 1
    return fib(n,0,1);
}
```