Recursion Review Assignment

1. Recall Euclid's algorithm from the Fraction Class assignment to find the greatest common divisor of two numbers, copy and pasted below. Write a recursive implementation of Euclid's algorithm that returns the GCD between two int parameters. Consider what the base case and recursive step will look like, and how you will communicate the subtraction of numbers from one recursive step to the next.

   Euclid's Algorithm is used to find the GCD between two numbers. Let's take 252 and 105, which have a GCF of 21. Euclid's Algorithm takes advantage of the fact that if you reduce the larger number by subtracting the smaller one from it, the GCF doesn't change. So, 242 – 105 = 147, and the GCF between 147 and 105 is still 21. You keep on repeating this process, subtracting the smaller number from the larger one until the numbers are equal. That number is the GCF!

   Let's illustrate this process:

   1. 252, 105 (Our two starting numbers)
   2. 147, 105 (252 – 105 to get 147)
   3. 42, 105 (147 – 105 to get 42)
   4. 42, 63 (105 – 42 to get 63)
   5. 42, 21 (63 – 42 to get 21)
   6. 21, 21 (42 – 21 to get 21)

   Our GCF is 21! In Java, you can use a while loop to repeat this process until the two numbers are equal.

2. When we were learning loops, we made some methods that produced stacks of lines that made triangles. We will rewrite these as recursive methods now. Write the methods triangle(int n) and reverseTriangle(int n) that recursively produce the following output:

triangle(5)	reverseTriangle(5)
*****	*
****	**
***	***
**	****
*	*****

Assume you have a method called "printStars" that prints a single line of n stars:

```
public void printStars(int n){
  for (int i = 0; i < n; i++) {
     System.out.print("*");
   }
   System.out.println("");
}
```

3. Write the method public String reverse(String word) that recursively builds and returns a String that is the same as the parameter String but in the reverse order.

4. Write a method public boolean isPalindrome(String word) that recursively checks and returns whether the word parameter is a palindrome or not. Can you find a way to do it without reversing the String?