Practical 3: Recursion

What am I doing today?
Today's practical focuses on 3 things:

1. Quick questions about Recursion
2. Comparing an iterative fibonacci algorithm to a recursive one
3. Help the monks solve the Towers of Hanoi

Instructions
Try all the questions. Ask for help from the demonstrators if you get stuck.
Solutions will be posted afterward.

*****Grading: Remember** if you complete the practical, add the code to your GitHub repo which needs to be submitted at the end of the course **for an extra 5%**

Warm-up questions

1. What are the two principal characteristics of a recursive algorithm?

- Break a bigger problem down into smaller problems, i.e divide and conquer.
- Call itself recursively until a base case is reached

2. Recursion is..

Answer	
	theoretically interesting but rarely used in actual programs
	theoretically uninteresting and rarely used in programs
X	theoretically powerful and often used in algorithms that could benefit from recursive methods

3. **True** or false: All recursive functions can be implemented iteratively

4. True or **false:** if a recursive algorithm does NOT have a base case, the compiler will detect this and throw a compile error?

5. True or **false**: a recursive function must have a void return type.

6. True or **False**: Recursive calls are usually contained within a loop.

7. **True** or False: Infinite recursion can occur when a recursive algorithm does not contain a base case.

8. **Which of these statements is true about the following code?**

```
int mystery(int n)
{
        if (n>0) return n + mystery(n-1);
        return 0;
}
```

Your answer	
	The base case for this recursive method is an argument with any value which is greater than zero.
x	The base case for this recursive function is an argument with the value zero.
	There is no base case.

9. **List common bugs associated with recursion?**

1	No base case – infinite regression
2	Incorrect or misplaced return statement
3	
4	

10. **What method can be used to address recursive algorithms that excessively recompute?**