# Problem #2

Using the following algorithm, answer the following questions:

```
public static void downToZeroByThree(int value) {
        If( (value != 1) {
                System.out.println(value);
                downToZeroByThree(value - 3);
        }
}
```

(a) What happens when the statement *downToZeroByThree(10)* is executed? Provide the output.

(b) What happens when the statement *downToZeroByThree(6)* is executed? Provide the output.

(c) How can the problem be broken into multiple subproblems of the same type?

(d) How does each recursive call diminish the size of the problem?

(e) What instance of the problem space can serve as the base case?

(f) Will this solution **always** reach the base case? If not, explain why.

(g) What change can be made to make the solution correct?

(h) A recursive method is cleaner when it is in the format:

```
public static void recursiveMethod(int parameter) {
        if(baseCase) return;
        else {
                recursiveWork;
        }
}
```

Rewrite the downToZeroByThree method in the format provided.

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**Coding – Submit all .java or OOPs code files to the Desktop. Submit separate files for each question.**

**The Maximum Character**. Using the provided method header, write a method to determine the character with the highest ASCII value within a string. Your main program must ask for the string. You can use the example executions below to test your work, but your code should work for different values.

*public static char maximumChar(String str, char max)*

Examples:
maximumChar("Data Structures", '\0') returns the character 'u'
maximumChar("Algoma U", '\0') returns the character 'o'
maximumChar("COSC2006", '\0') returns the character 'S'
maximumChar("1234", '\0') returns the character '4'

**Reverse Number.** Using the provided method header, write a method to reverse a number. In your reverse method, if the number is negative, reverse the number and put the negative sign after the reversed number. (this check is not in main) Your main program must ask for the number. HINT: you will need to use the divide operation and the modulus operator for this question. You can use the example executions below to test your work, but your code should also work for different values. You are not allowed to use any string operations here.

*public static void reverse(int number)*

Examples:
Reverse(12345) prints 54321
Reverse(-12345) prints 54321-

**Your methods for this problem must be recursive - if they are not, you will receive a zero for question.**

**Your method headers must match the ones provided, and you must use all parameters. If you do not, you will receive a zero for that question.**

**Do not use any static variables in any of your programs. Doing so will result in a zero for the entire problem.**

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