

## Modulus Operator and Prime Numbers

This assignment is not being collected or graded. It's good practice though, so please take it seriously and continue to work on it at home if you want to.

Create a new project and a new class that includes a main method. Inside the class, write each of the following methods. **After you have written each method below, write some code in the main method that will test the method you have written by calling it!**

**public static void findIt()**

**Let's see who can get this first! Your TA knows the answer – ask him/her if yours is correct!** If you get stuck on this one, just move on to some of the others.

This method will print the *smallest* positive integer such that: When the number is divided by 16 the remainder is 15, when it is divided by 15 the remainder is 14, when divided by 14 the remainder is 13, when divided by 13 the remainder is 12,....,when divided by 2, the remainder is 1.

**public static void howManyFactors(int n)**

This method will print the number of factors n has (including 1 and itself). For example, if n is 24 then it should print 8 because 24 has 8 factors: 1, 2, 3, 4, 6, 8, 12, 24.

**public static void isItPrime(int n)**

This method will print YES or NO, depending on whether or not n is prime. Hint: You can do pretty much the same thing you did in the previous method with a little modification!

**public static void printNthPrime(int n)**

This method will print the nth prime. For example, if n is 1 then it should print 2, because 2 is the first prime. If n = 2 then it should print 3, because 3 is the second prime. To help you test your method, I'll tell you that the 100<sup>th</sup> prime is 541, the 10,000<sup>th</sup> prime is 104729, and the 1,000,000<sup>th</sup> prime is 15485863.

If you get this method working (good job), how long does it take your computer to compute the 10,000<sup>th</sup> prime? Does it take a while? Another challenge for you: Try to think of ways to optimize this computation (speed it up!) Can you find the 1 millionth prime in less than a minute? (If you know about arrays or collections then it's pretty easy, but try to do it without using those things.)