Instructions:

- Your submission will consist of four files (and nothing else):
  - `fizzbuzz.m`
  - `factorsoftwo.m`
  - `primesearch.m`
  - `longest_collatz_sequence.m`
- Very Important: Create a single compressed (.zip) folder with these files. Name it LastNameFirstNameHW3, e.g. SchangTomHW3.zip

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1 (Fizzbuzz). Write a script `fizzbuzz.m` that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".

Hint: you might find the functions `mod` and `disp` helpful.

The "Fizz-Buzz test" is an interview question designed to help filter out the 99.5% of programming job candidates who can't seem to program their way out of a wet paper bag.
(- Anonymous)

2. Write a function

```
function [n, B] = factorsoftwo(A)
```

which finds the decomposition of an integer A in the form $A = 2^n \times B$, where B is not divisible by 2.

3 (1001st Prime): By listing the first six prime numbers: 2, 3, 5, 7, 11 and 13, we can see that the 6th prime is 13. What is the 1001st Prime Number? Write a script `primesearch.m` and save the value of 1001st Prime Number as a variable named `myprime`.

Source: Project Euler, Problem 7

4 (Collatz Conjecture): The following iterative sequence is defined for the set of positive integers:

$$n \to n/2 \text{ (if } n \text{ is even)}$$
$$n \to 3n + 1 \text{ (if } n \text{ is odd)}$$

As an example, using the rule above and starting with 13, we generate the following sequence:

$$13 \to 40 \to 20 \to 10 \to 5 \to 16 \to 8 \to 4 \to 2 \to 1$$

It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proven, it is thought that all starting numbers finish at 1 (Collatz Conjecture).

Write a function

```
function longest_starting_number = longest_collatz_sequence(n)
```

which given an integer n, determines the starting number from 1 to n that produces the longest chain.

Note: You might want to first write a function `collatz` that computes the length of the sequence for a given input. Include it as a local function (subfunction). In other words, you should not be submitting a separate file called `collatz.m`.

Note: If there is a tie choose the smallest starting value.

Source: This question was modified from #14 from Project Euler.