W1: Collatz

One of the most renowned unsolved problems in math is known as the Collatz conjecture. The problem is stated as follows:
Start out with an arbitrary, natural number *n*:

- if *n* is even, the next number is *n / 2*.
- if is *n* is odd, the next number is *3 n + 1*.

This next number is treated exactly as the first. This process is repeated.
For example, if *n*=11 then the sequence is:

11 34 17 52 26 13 40 20 10 5 16 8 4 2 1 4 2 1 4 2 1...

Once the sequence has reached 1, the values repeat indefinitely. The conjecture is that every sequence ends with:

4 2 1 4 2 1 4 2 1...

This conjecture is probably correct. By the year 2020, all numbers up to 2^{68} have been found to end with this sequence using a computer program. This problem might seem very simple, but no one has proved the conjecture since the mathematician Lothar Collatz stated it in 1937. There have even been mathematicians that have spent years of continued study on the conjecture, without success. Fortunately, writing a program that generates the Collatz sequence is a lot less challenging.

Write a program that takes any positive integer and prints the corresponding Collatz sequence. End the sequence when it has reached the number one for the third time.

The program output should look as follows, using the number 11 as example:

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Enter the first number of the sequence: 11
11 34 17 52 26 13 40 20 10 5 16 8 4 2 1 4 2 1 4 2 1 ...
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Hint: Use the % (modulo) operator to test whether a number is even or odd.

Solve alone or in pairs

You can choose to solve a warm-up assignment all by yourself. But you may also choose to do it together with another student from the same group. If so, one student must create a group (in CodeGrade) and the other student must join it. Both students must be present and able to explain their shared program when getting approval by the TA.

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