Name: _____

Date: _____

Question:	1	2	3	4	Total
Points:	5	10	20	20	55
Score:					

Course logistics

1. (5 points)

   ☐ I've created a gitlab account on the UConn GitLab server

2. (10 points)

   ☐ ~~I've installed git on my computer~~ I've uploaded Homework 2 to the GitLab server

   Upload your homework 2 as following (the steps are exactly as we did in class):

   1. Use gitlab web interface to create a new project called **hw02** (the name is case sensitive, must be exactly as shown)
   2. Use gitlab web interface to add *README* file and edit it to add some meaningful content, e.g. the explanation of your reasoning while writing the code
   3. Use gitlab web interface to upload your matlab code to your project
   4. Use gitlab web interface to add the access to your project (with the permission of the *reviewer*) to the user `michael.rozman`

Sign and date here: _____

Matlab basics

3. The two roots of the quadratic equation $ax^2 + bx + c = 0$, are

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(a) (10 points) Write a matlab function (call it `solve2`) that accepts three coefficient of the quadratic polynomial, a, b, and c, and returns the two roots.

Test your function, e.g. using the sets of oefficients $(1, 2, 1)$ and $(1, -3, 2)$.

(b) (5 points) Use your function to compute both roots for $a = 1.$, $b = 100000000.$, $c = 1$. Compare your computed results with Matlab's own function `roots([a b c])`. Calculate the relative error produced by your code for each root. (assume that Matlab code works correctly with the full machine precion.)

(c) (5 points) You should find that the classic formula is good for computing one root, but not the other. So use your function to compute one root accurately and then use the fact that $x_1 x_2 = \frac{c}{a}$ to compute the other.

4. This assignment describes an unsolved problem in number theory:

Start with any positive integer n. Repeat the following steps:

- If n = 1, stop.
- If n is even, replace it with n/2.
- If n is odd, replace it with 3n + 1.

For example, starting with n = 7 produces 7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1. The sequence terminates after 17 steps.

The unanswered question is, does the process always terminate? Or is there some starting value that causes the process to go on forever, either because the numbers get larger and larger, or because some periodic cycle is generated?

As a start of your investigation of that sequence, write the following codes:

(a) (10 points) Write a matlab function (call it `threenoneseq`) that accepts a parameter n returns the sequence produceb by your algorithm.

(b) (10 points) Use your function and write a program that determines the length of the sequence for $100 \le n \le 200$. Plot the graph of the length of the sequence vs the starting parameter n.