

Homework#1, Due Date: Thursday Feb 25 in class

Convergence of sequence

The sequence $\{1/2^n\}_{n=1}^{\infty}$ can be approximated using the following schemes:

(a) $p_0 = 1$, $p_1 = 0.497$, and $p_n = \frac{2}{3}p_{n-1} - p_{n-2}$, for $n = 1, 2, 3, \dots$

(b) $q_0 = 1$, $q_1 = 0.497$, and $q_n = \frac{5}{3}q_{n-1} - q_{n-2}$, for $n = 1, 2, 3, \dots$

Write a Matlab code that generates and returns the absolute error for the n th approximate of the sequence and plots both the sequence and the approximate for the numbers $[1, n]$.

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Roots of Quadratic Formula

Assume that $a \neq 0$ and $b^2 - 4ac > 0$ and consider the equation $ax^2 + bx + c = 0$. The roots can be computed as:

$$(i) \quad x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

OR

$$(ii) \quad x_1 = \frac{-2c}{b + \sqrt{b^2 - 4ac}} \quad \text{and} \quad x_2 = \frac{-2c}{b - \sqrt{b^2 - 4ac}}$$

if $b > 0$ then x_1 computed with formula (ii) and x_2 computed using (i). However, if $b < 0$ then x_1 computed with formula (i) and x_2 computed using (ii)

Write a Matlab function that computes the roots of a quadratic formula. The function takes input (a, b, and c) and returns output (x_1 and x_2). Use the appropriate formulas based on the value of b .

Function Header:

```
function [x1, x2] = RootsQuadratic (a, b, c)
```

Function Call example:

```
>> [a, b] = RootsQuadratic (1, 100, 1)
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