Introduction

- Very exciting to join in this research program. These 40 days studied in NCU, I basically learned four methods of finding roots of equations. Learned how to use basic MATLAB function and learned how to input MATLAB code. I got to find out the roots of equations with each different methods.

Methods

- Week 2: The Newton Method
- Week 3: The Bisection Method
- Week 4: The False Position Method
- Week 5: The Secant Method

Comparision of Four Methods

The Newton Method
A process for approximating the roots of an equation by replacing the curve representing the equation by its tangent and finding the intersection of the tangent with the x-axis and iterating this process.
The process is repeated as:

\[ x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \]

The Bisection Method
The bisection method in mathematics is a root-finding method which repeatedly bisects an interval and then selects a subinterval in which a root must lie for further processing.

The False Position Method
The false position method or regula falsi method is a term for problem-solving methods in arithmetic, algebra, and calculus. In simple terms, these methods begin by attempting to evaluate a problem using test ("false") values for the variables, and then adjust the values accordingly.

The Secant Method
Secant Method: An iterative method for finding a root of the nonlinear equation \( f(x) = 0 \). It is given by the formula:

\[ x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \]

Example: market equilibrium

The demand equation for the “Tempus” quartz wristwatch is given by

\[ p = 50e^{-0.1(x + 1)^2} \]

Where \( x \) is the quantity demanded per week and \( p \) is the unit wholesale price in dollars. National Importers, the supplier of the watches, will make \( x \) units available in the market if the unit wholesale price is

\[ p = 10 + 5x^2 \]

Dollars. Find the equilibrium quantity and price

Recording data by Excel

<table>
<thead>
<tr>
<th>The Newton Method</th>
<th>The Bisection Method</th>
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</thead>
<tbody>
<tr>
<td>(iteration)</td>
<td>root</td>
</tr>
<tr>
<td>1</td>
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<tr>
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<td>1.73676429</td>
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<tr>
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<td>1.88938891</td>
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</table>

Conclusion

By solving the equation, I got to know different iteration between each one. I recorded data from those four methods. And I found out the best method which is the Newton Method to solve the question.