Universidad del Valle

SIMULACIÓN Y COMPUTACIÓN NUMÉRICA

Taller Polinomios

En los grupos asignados para el proyecto (máximo 3 integrantes), deben realizar los siguientes ejercicios seleccionados del libro de Kincaid, páginas 128 y 129:
En el siguiente enlace, encontrarán una copia del libro de Kincaid y otros textos que pueden ser de utilidad:
https://drive.google.com/drive/folders/1VLbSjnIwkvIxPLI6w33SduesH6rqVtoF?usp=sharing

- **Problems 3.5**

1. Use Horner's algorithm to find $p(4)$, where

$$p(z) = 3z^5 - 7z^4 - 5z^3 + z^2 - 8z + 2$$

3. (Continuation) For the polynomial of Problem **3.5.1** (above), start Newton's method at the point $z_0 = 4$. What is z_1?

4. (Continuation) For the polynomial of Problem **3.5.1** (above), apply Bairstow's method with the initial point $(u, v) = (3, 1)$. Compute the corrections δu and δv.

5. (Continuation) For the polynomial of Problem **3.5.1** (above), find a disk centered at the origin that contains all the roots.

6. (Continuation) For the polynomial of Problem **3.5.1** (above), find a disk centered at the origin that contains none of the roots.

10. For the polynomial $p(z) = 9z^4 - 7z^3 + z^2 - 2z + 5$, compute $p(6)$, $p'(6)$, and the next point in the Newton iteration starting at $z = 6$.

- **Computer Problems 3.5**

1. Write a program that takes as input the coefficients of a polynomial p and a specific point z_0 and produces as output the values $p(z_0)$, $p'(z_0)$, and $p''(z_0)$. Write the pseudocode with only one loop. Test on the polynomial in Problem **3.5.1** (p. 128), taking $z_0 = 4$.

4. Using Newton's method and the polynomial $p(z) = z^3 - 1$, find three nearby starting points (within 0.01 of each other) so that the resulting sequences converge to different roots. Using a plotter, show the paths of these sequences of points within a square containing the roots by connecting successive points with line segments.