

ECE326 (Programming Languages) – Fall 2022

Practical Assignment 2

Submission due date: October 12, 2022 11:59 PM

- Goal: to familiarize with Numerical Analysis using Python
- Newton–Raphson method is a root-finding algorithm which produces successively better approximations to the roots (or zeroes) of a real-valued function. The complete method is explained in the following webpage:

<https://www.sciencedirect.com/topics/mathematics/newton-raphson-method>

- With a good initial choice of the root's position, the algorithm can be applied iteratively to obtain:

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

- Define a python function `newton_raphson()` to compute square root of 12345. You may use 100 (or another number of your choice for convergence) as initial guess x_0
- Now define a randomized version of the `newton_raphson_randomized()` which will make a random guess of the initial approximation. Determine the probability (Hint: number of times converged / total number of runs) of convergence of `newton_raphson_randomized()`.
- You may use pseudo-random functions defined here:
<https://docs.python.org/3/library/random.html>
- Analyze and compare accuracy and runtime performance of `newton_raphson()` and `newton_raphson_randomized()` methods.
- Submit complete python code along with a concise lab report with the naming convention `ECE326_Lab2_<your section PRA00x>_< your UTORid >.pdf`