1, Write the algorithms of all methods?

* Ans: - An algorithm is a procedure that describes, in an Unambiguous manner, a finite sequence of steps to be performed in a specified order.
* The object of the algorithm is to implement a procedure to solve a problem or approximate a solution to the problem.
* We use a pseudocode to describe the algorithms. This pseudo code specifies the form of the input to be supplied and the form of the desired output.
* An algorithm that satisfies this property is called **stable**; otherwise, it is **unstable**. Some algorithms are stable only for certain choices of initial data and are called conditionally stable. We will characterize the stability properties of algorithms whenever possible. This are all are methods of algorithms:-
* Bisection Method,
* False position (Regular False) Method,
* Fixed point Iteration Method,
* Newton method,
* The Secant method ,

2,List the similarity and difference between all methods?

Ans: - List ….?

* The Bisection method ,
* The Secant method ,
* Newton method,
* ………etc

Ans:- difference between all methods?

* The Bisection method
* The bisection method does not (in general) produce an exact solution of an equation f (x) = 0. However, we can give an estimate of the absolute error in the approxiation.
* Very stable Algorithm - Good technique to ﬁnd starting point for Newton’s method
* Costs only one function evaluation, so rapid iterations
* Linear convergences, so slow (3.3 iterations/digit)
* The Secant method
* The secant method is a variant of Newton’s method, where f0(xn) is replaced by its ﬁnite diﬀerence approximation based on the evaluated function values at xn and at the previous iterate xn−1.
* Assuming convergence, observe that near the root

f0 (xn) ≈ f (xn) −f (xn−1)/ xn −xn−1

* Substitution of this approximation into the formula for Newton’s method yields the Secant method,

Xn+1 =

F (xn)(xn −xn−1) f (xn)−f (xn−1)

, n = 0,1,2,3, ···

* Hard to ﬁnd starting points (Unknown basin of attraction)
* Costs only two function evaluations, so rapid iterations
* Superlinear convergences, α ≈ 1.62, which is pretty fast
* The Newton’s method
* Newton’s method is an extremely powerful technique, but it has a major weakness; the need to know the value of the derivative of f at each approximation.
* Frequently, f0(x) is far more diﬃcult and needs more arithmetic operations to calculate than f (x).
* Hard to ﬁnd starting points (Unknown basin of attraction)
* Finding and evaluating derivative requires more machine work at each iteration
* Quadratic convergences is very fast- doubling the digits at each iteration

Ans: - The basic similarity of all methods?

* All of the methods to determine of Root
* The error decreases slowly at ﬁrst but then rapidly after a few iterations
* The method is guaranteed to converge

Thank you!!