1, **Write the algorithms of all methods?**

Methods of algorithms:-

1. *Bisection Method*
2. *False position Method*
3. *Fixed point Iteration Method*
4. *Newton method*
5. *The Secant method*

2,**List the similarity and difference between all methods?**

***B) difference between all methods*** ?

1. The Bisection method

* The bisection method does not 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)

1. The False Position

The false position generates approximation in the same manner as the secant method,but it includes a test to ensure that the root is always bracketed between successive iterations.

Although it is not amethod we generally recommend,it illustrates how bracketing can be incorporated.

1. Fixed-Point Iteration

A fixed point for afunction is a number at which thhe value of yhe function doesn’t change when the function is applied.

4) 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

5)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