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

* Those are all methods of algorithms:-

*Bisection Method*

*False position Method,*

*Fixed point Iteration Method,*

*Newton method,*

*The Secant method*

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

***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