**General Instruction:**

* Try to optimize your algorithms as much as possible.
* There will be marks allocated for your code optimization , completeness and theorical understanding.
* Your File and Function names must start with your student no.

Example: 1505xxx\_bisection.m

1. ln (x) function can be expanded using Taylor series and the expanded series is given below.



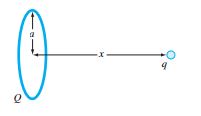
Now write a Matlab function which will take the value of x and iteration (number of terms) number n and return the approximated value of ln (x).

Write a series of Matlab commands that will do the following things.

* Plot the ln x function for the given interval with step size 0.1 using the built-in log (x) function.
* In the same plot show four approximated functions for the same interval using different number of terms (1, 3, 5, 200).
* Draw another plot showing the relative approx. error for each iteration while determining the value of ln (1.5) upto 50 terms.

1. A total charge Q is uniformly distributed around a ringshaped conductor with radius a. A charge q is located at adistance x from the center of the ring (Fig. 1). The force exerted on the charge by the ring is given by

F=(1/4πe0) (qQx/(x2+a2)3/2)



where e0 = 8.9 × 10-12 C2/(N m2). Find the distance x where the force is 1.25 N if q and Q are 2 × 10-5 C for a ring with a rdius of 0.85 m.

* Use graphical model to estimate the value.
* Use Bisection method and False Position method to estimate the value for εs=0.5%. Report the number of iterations for each method while achieving the expected result.
* Note: You must write your Bisection method and False Position method on separate .m file and you must pass your function as an argument to the method functions. The prototype is given below.
* Bisection method (function , lower bound of the bracket, upper bound of the bracket, expected relative approximation error, max iteration)
* False Position method (function , lower bound of the bracket, upper bound of the bracket, expected relative approximation error, max iteration)