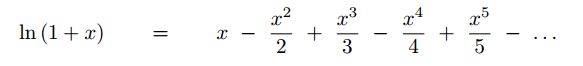
1. ln (1+x) function can be expanded using Taylor series and the expanded series is given below.



Now write a single program to perform the following tasks:

1. Take the value of x and iteration (number of terms) number n and return the approximated value of ln(1+x). [2]
2. Plot the ln (1+x) function for the interval -1<x<=1 with step size 0.1 using the built-in log (x) function. [3]
3. In the same plot (one plot for 1(a) and 1(b)) show five approximated functions for the same interval using different number of terms (1, 3, 5, 20, 50). [5]
4. Draw another plot showing the relative approx. error for each iteration while determining the value of ln(1.5) upto 50 terms. [5]
5. In a chemical engineering process, water vapor (H2O) is heated to sufficiently high temperatures that a significant portion of the water dissociates, or splits apart, to form oxygen (O2) and hydrogen (H2):

H2O←→ H2 + 1/2 O2

If it is assumed that this is the only reaction involved, the mole fraction *x* of H2O that dissociates can be represented by

K=x/(1-x) \*√(2p*t*/(2+x))

where *K* is the reaction’s equilibrium constant and *pt* is the total pressure of the mixture. If *pt*= 3 atm and *K* = 0*.*05, determine the value of *x* that satisfies given equation.

Write a single program which does the following:

* Uses graphical model to estimate the value. [5]
* Uses Secant 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. [7.5+7.5=15]

Secant Method and False Position method should be implemented as separate functions following the prototype given below:

* Secant method (function , 1st initial guess, 2nd initial guess, 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)

Please note that following the prototypes is mandatory.