HW3. In this homework, you will write a C program that will find A ROOT of an equation of the form

$$F(x)=Ax^3+Bx^2+Cx+D=0,$$

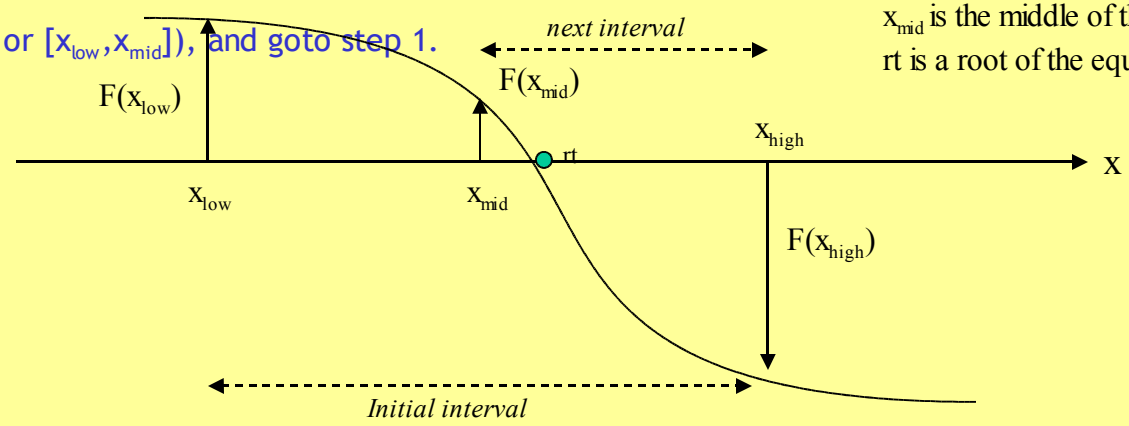
using the modified version of bisection method explained as below, given an interval of x, and an epsilon value ε:

1. Calculates the F(x) for the endpoint of the interval ($F(x_{low})$ and $F(x_{high})$, as in the example graph below).
2. If $|F(x_{low})| \le \varepsilon$ then output $x_{low}$ as the root,

   else if $|F(x_{high})| \le \varepsilon$ then output $x_{high}$ as the root,

   else if the signs of $F(x_{high})$ and $F(x_{low})$ are the same, output "No roots in that interval"

   else find the middle of the interval as $x_{mid}=(x_{high}+x_{low})/2$. Then, calculate $F(x_{mid})$. If $|F(x_{mid})| \le \varepsilon$ then output $x_{mid}$ as the root and stop, otherwise if $|F(x_{mid})| > \varepsilon$ , assign $x_{mid}$ to $x_{low}$ or $x_{high}$ such that the signs of $F(x_{low})$ and $F(x_{high})$ will be different (i.e. $x_{mid}$ will be one of the new ends of this new half interval for the next iteration, $[x_{mid},x_{high}]$ or $[x_{low},x_{mid}]$), and goto step 1.




$x_{mid}$ is the middle of the interval $[x_{low}, x_{high}]$.
rt is a root of the equation.

Your program, firstly, inputs the coefficients of the equation. Then, <u>repeatedly:</u>
-asks an interval of x ($x_{low}$ and $x_{high}$), and an epsilon value to find out a root of the equation in this interval as explained above.
-If the user inputs 0.0 and 0.0 as the interval, then the program stops.

Not: This is a simplified version of bisection method of finding the roots of an equation. You may refer to chapter 7 of the text book (Hanly Koffman's) to check the explanation of the general form of this method. But *<u>do not use that solution</u>* as it uses function that we have not covered yet.