Bisection

∗ The user must guarantee that the function is continuous in the given interval

1) Ask the user for a function, a tolerance, and a max number of iterations.
2) Ask the user for the values A and B, these will be the values for the initial interval.
3) We create a variable i to count the number of iterations. We begin with 1.
4) We evaluate A and B in the function to obtain f(A) and f(B). If f(A) or f(B) = 0, we tell the user that this is the root.
5) We make a conditional to being to execute the method... if f(A)∗ f(B)<=0 then execute... to verify that in the interval there is a root. In the case that there does not exist a root, we tell the user that one does not exist.
6) Error=$(A+B)/2^i$
7) Next, find the middle value of the interval. M=(A+B)/2 and we evaluate this in the function
8) Cycle : while the error > tolerance, i < number of max iterations, f(M)≠ 0, f(A)∗ f(B)<0, do:
   a) If f(A)∗ f(M) < 0:
      (i) B=M
      (ii) f(B) =f(M)
      (iii) M = (A+B)/2
      (iv) f(M) = the new value of M evaluated in the function
      (v) i=i+1
      (vi) Error = $(A+B)/2^i$
   b) If f(M)∗ f(B) < 0
      (i) A = M
      (ii) f(A)=f(M)
      (iii) M = (A/B)/2
      (iv) f(M) = the new value of M evaluated in the function
      (v) i = i +1
      (vi) Error = $(A+B)/2^i$

9) If error <= tolerance, tell the user that the root is located in the interval [A,B] (with the final values) with an error of : ___(with the final value of the error)

10) If f(M) = 0, tell the user that M is the root.

11) If i = max number of iterations tell the user that he/she has reached the limit of iterations and the root is in the interval [A,B] (with the final values) with an error of: ___(with the final value of the error).