

Iterative methods

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Sorry for eventual errors in writing in English.

Explanation of the algorithm

There are three different algorithms implemented here:

- **Newton-Raphson**: this algorithm start from a point X_0 to calculate a zero of the function near it. To search next X_i :

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$$

Now:

1. evaluate $f(x_i)$;
 2. If you think you can stop ..., else ...
 3. calculate $f'(x_i)$ and x_i and return to point 1.
- **Bisection algorithm**: This algorithm needs an interval $[a,b]$ to start. Calculate

$$x_{i+1} = \frac{a+b}{2}$$

1. calculate x_i , evaluate $f(x_i)$.
 2. if $f(a_i)*f(x_i) < 0$, then $[a_{i+1}, b_{i+1}] = [a_i, x_i]$ and return to point 1; else if $f(b_i)*f(x_i) < 0$ then $[a_{i+1}, b_{i+1}] = [x_i, b_i]$ and return to 1.
 3. if you think to stop ...
- **Secants algorithm**: Need an interval $[a,b]$ to start. Calculate

$$x_i = a_i - \frac{b_i - a_i}{f(b_i) - f(a_i)} * f(a_i)$$

1. calculate x_i and evaluate $f(x_i)$;
2. if $f(a_i)*f(x_i) < 0$, then $[a_{i+1}, b_{i+1}] = [a_i, x_i]$ and return to point 1; else if $f(b_i)*f(x_i) < 0$ then $[a_{i+1}, b_{i+1}] = [x_i, b_i]$ and return to 1.
3. if you think to stop ...

Applet

The Applet *Itearion* comes with 3 programs: **.ITER.SV**, **.ITER.S**, **.ITER.PR**.

Start applet, press "views" and enter *setup* to enter a function in $F1(X)$. Now press "views" and select *start*. Now choose the algorithm you want.

In some screens I suggest to you to use limit digits numbers to see all operations.