

Iterative methods: False Position Method

Numerical Methods

September 30, 2021

Lecture Notes

False Position Method

Algorithm

To find a root of a function given as $f(x) = 0$,

1. Choose two points a and b such that $f(a) \cdot f(b) < 0$

2. Calculate point c using

$$c = \frac{a \cdot f(b) - b \cdot f(a)}{f(b) - f(a)}$$

3. if $f(a) \cdot f(c) < 0$

 update $b = c$

 else

 update $a = c$

4. Repeat steps 2 and 3 until $|a - b| < \text{Tolerance Value}$

5. The root is value of c in last iteration.

Example:

Find the root of the expression $f(x) = x^3 + 4x^2 - 3x - 12$

iter	a	b	f(a)	f(b)	$c = \frac{a \cdot f(b) - b \cdot f(a)}{f(b) - f(a)}$	f(c)
0	1	2	-10	6	1.625	-2.021484
1	1.625	2	-2.021484375	6	1.719503287	-0.2477027978
2	1.7195	2	-0.2477673101	6	1.730623771	-0.02831710109
3	1.7306	2	-0.02878847138	6	1.73188643	-0.00326369988
4	1.7319	2	-0.002994287241	6	1.732033728	-0.0003391362147
5	1.73203	2	-0.0004131595636	6	1.732048451	-0.00004679047294
6	1.73204	2	-0.0002145984063	6	1.732049584	-0.00002430317181
7	1.73204	2	-0.0002145984063	6	1.732049584	-0.00002430317181

Table 1: Solution of $f(x) = x^3 + 4x^2 - 3x - 12$

From the table, the root of given equation is 1.73204.

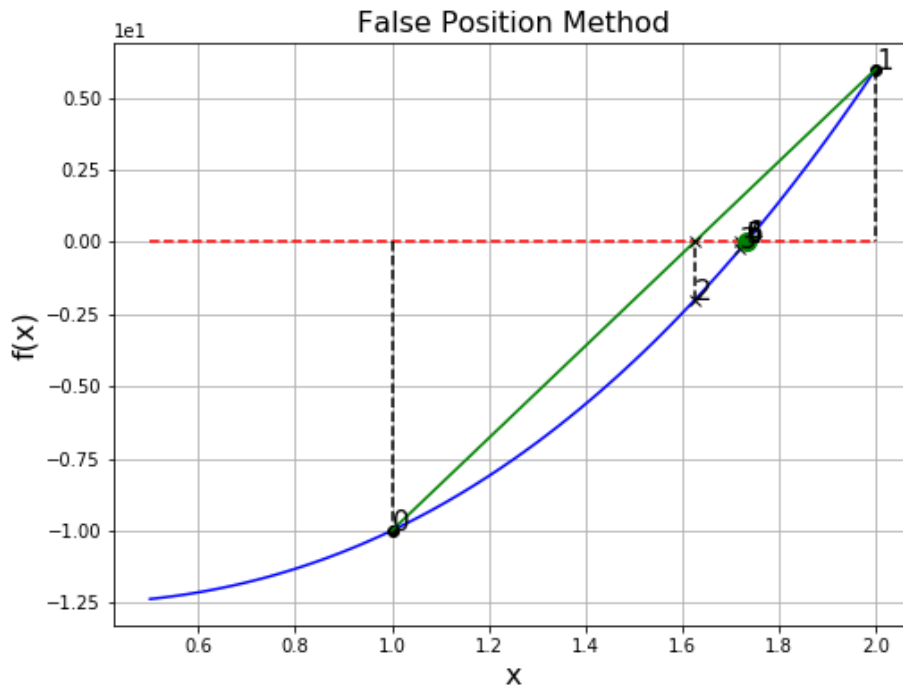


Figure 1: False Position method on $f(x) = x^3 + 4x^x - 3x - 12$

- Bracketing method.
- Linear convergence.
- Certainty of finding root.

Practice Exercises

- Find the root of the following expressions using False Position method:
 1. $x^4 - 19 = 0$
 2. $f(x) = \sin(x) - 4e^{-2x}$
 3. $4 \ln(x) + 0.2x^2$
 4. $x^5 + 6x^3 - 4x + 10$