Numerical Method Topic - Fixed-Point Iteration Method

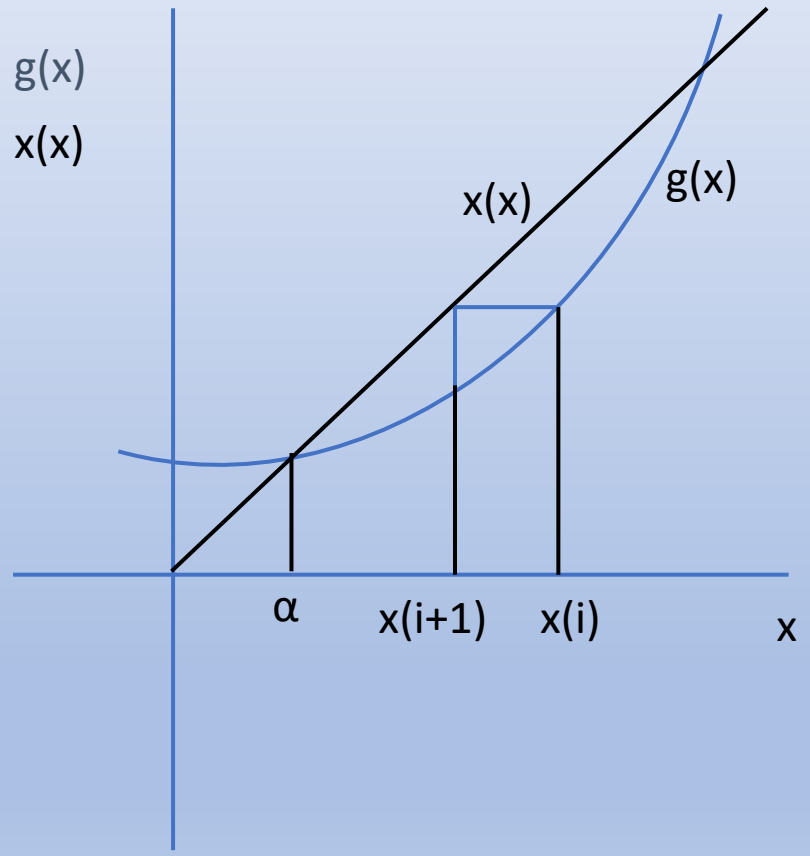
Objectives

- Solve a nonlinear equation using Fixed – Point Iteration Method
- Fixed – Point Iteration method belongs to a group called open domain methods.
- The nonlinear equation, f (x) = 0, could be an algebraic equation, a transcendental equation etc

- Examples of nonlinear equations:

- f (x) = x^3 - 2*x^2 - 2*x + 1;
- f (x) = exp(x) - 2*x - 2;

Fixed-Point Iteration Method - Algorithm



- $f(x) = 0$; .....(1)
- $x = g(x)$ .....(2)
- $x(i+1) = g(x(i))$ .....(3)

- Iteration stopping criteria
- $|x(i+1) - x(i)| <= \varepsilon 1$
- $|f(x(i+1))| <= \varepsilon 2$

Fixed-Point Iteration Method - Algorithm

- Examples:

- f (x) = x^3 - 2*x^2 - 2*x + 1;
- x = (-x^3 + 2*x^2 - 1) / (-2*x);
- x(i+1) = (-x(i)^3 + 2*x(i)^2 - 1) / (-2*x(i));

- f (x) = exp(x) - 2*x - 2;
- x = (-exp(x) + 2) / (-2);
- x(i+1) = (-exp(x(i)) + 2) / (-2);

Summary

In this video,

- We presented Fixed Point Iteration method to solve non-linear equations.
- Fixed Point Iteration method belong to a group called open domain methods.
- In the next video, we can look at other open domain methods.