Introduction to Computer for Engineers

Lecture 5
Finding Root

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Fixed point

$\widetilde{x}$ is called **fixed point** of a function g(x) if

$$\widetilde{x} = g(\widetilde{x})$$

How to find fixed point of a function starting from an initial value x_0 in MATLAB ?

Fixed point iteration

$\widetilde{x}$ is called **fixed point** of a function g(x) if

$$\widetilde{x} = g(\widetilde{x})$$

How to find fixed point of a function starting from an initial value x_0 in MATLAB ?

$$x_{k+1} = g(x_k) \text{ for k = 0,1,2..}$$

We keep iterating until $x_{k+1} \sim x_k$

Application of Fixed point iteration

Condition 1 : If a function f(x) can be spitted in 2 terms

$$f(x) = g(x) - x$$

Hence, the solution $\widetilde{x}$ of f(x) = 0 can be considered as a fixed point of g(x), eg.

$$\widetilde{x} = g(\widetilde{x})$$

Application of Fixed point iteration

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Advantage: solution of f(x) can be calculated iteratively and it is suitable for using computer to calculate the solution of any function satisfying the condition 1

Application of Fixed point iteration

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$$f(x) = g(x) - x$$

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$$\widetilde{x} = g(\widetilde{x})$$

Case f(x) can not written in 2 terms ?

End of Lecture 5