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MS Excel and VBA

Module 1: Highlights of Excel

Bruno Abreu Calfa

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Introduction

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- Excel's main features are: calculation, graphing, and a "macro" programming language called *Visual Basic for Applications (VBA)*
- VBA allows you to programmatically operate on the information stored in Microsoft Office applications (not only in Excel)

Software and Programming Requirements

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Help with Excel and VBA

- Google

Observation: Many times I find answers at www.ozgrid.com

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- References used in this material:

- Walkenbach, J. (2010) **Excel® 2010 Power Programming with VBA**. Wiley Publishing, Inc. 1080p.
- Billo, E. J. (2007) **Excel® for Scientists and Engineers: Numerical Methods**. John Wiley & Sons, Inc. 480p.
- Webb, J., Saunders, S. (2006) **Programming Excel with VBA and .NET**. O'Reilly Media. 1120p.

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- See file **Excel_Basics.xlsx**, worksheet “Writing in a Worksheet”

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- Best explained with examples (see file **Excel_Basics.xlsx**, worksheet “Fill Handle”)

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- See file **Excel_Basics.xlsx**, worksheet “Data” contains the raw data and worksheet “Data Table” contains the data table generated

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- See file **Excel_Applications.xlsx**, worksheet “2-Way Lookup”
- Notice that we are **not** performing *interpolation*

Finding Roots of Equations

- Given the general nonlinear equation

$$f(x) = 0$$

the goal is to find a value x^* such that $f(x^*) = 0$

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- Let us look at three (iterative) methods

Bisection Method

- It is based on the *Intermediate Value Theorem*

Bisection Method

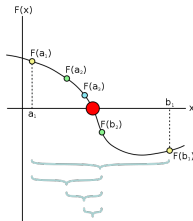
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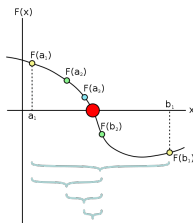
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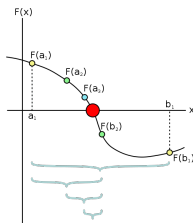
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- Idea: compute the intermediate point $c_k = (a_k + b_k)/2$ and decide the next values of the bounds a_{k+1} and b_{k+1} based on the signs of $f(c_k)$, $f(a_k)$, and $f(b_k)$

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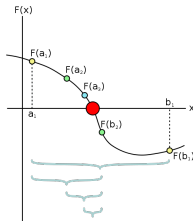
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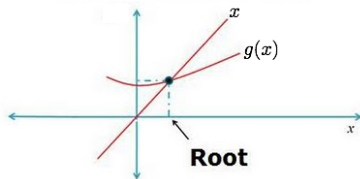


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- See file **Excel_Applications.xlsx**, worksheet “Bisection”

Successive Substitution Method

- It is based on the *fixed-point* problem

$$f(x) = x - g(x) = 0$$



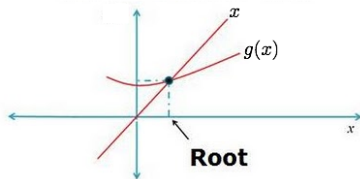
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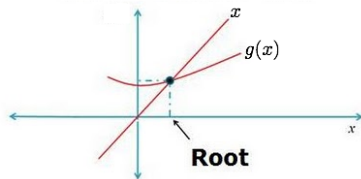
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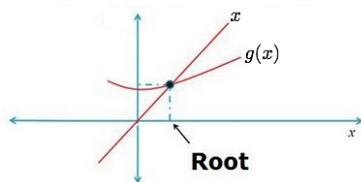
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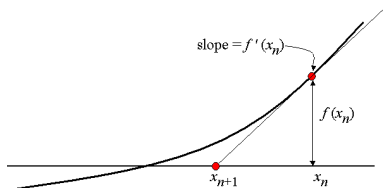
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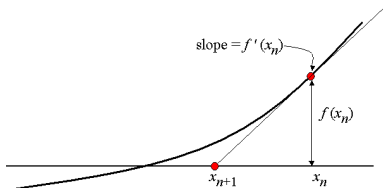
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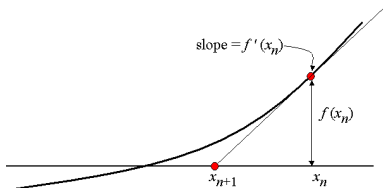


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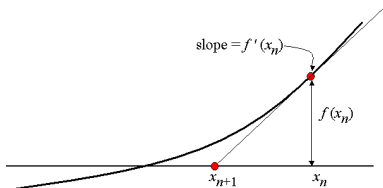
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