

Part 2. Roots of Equations

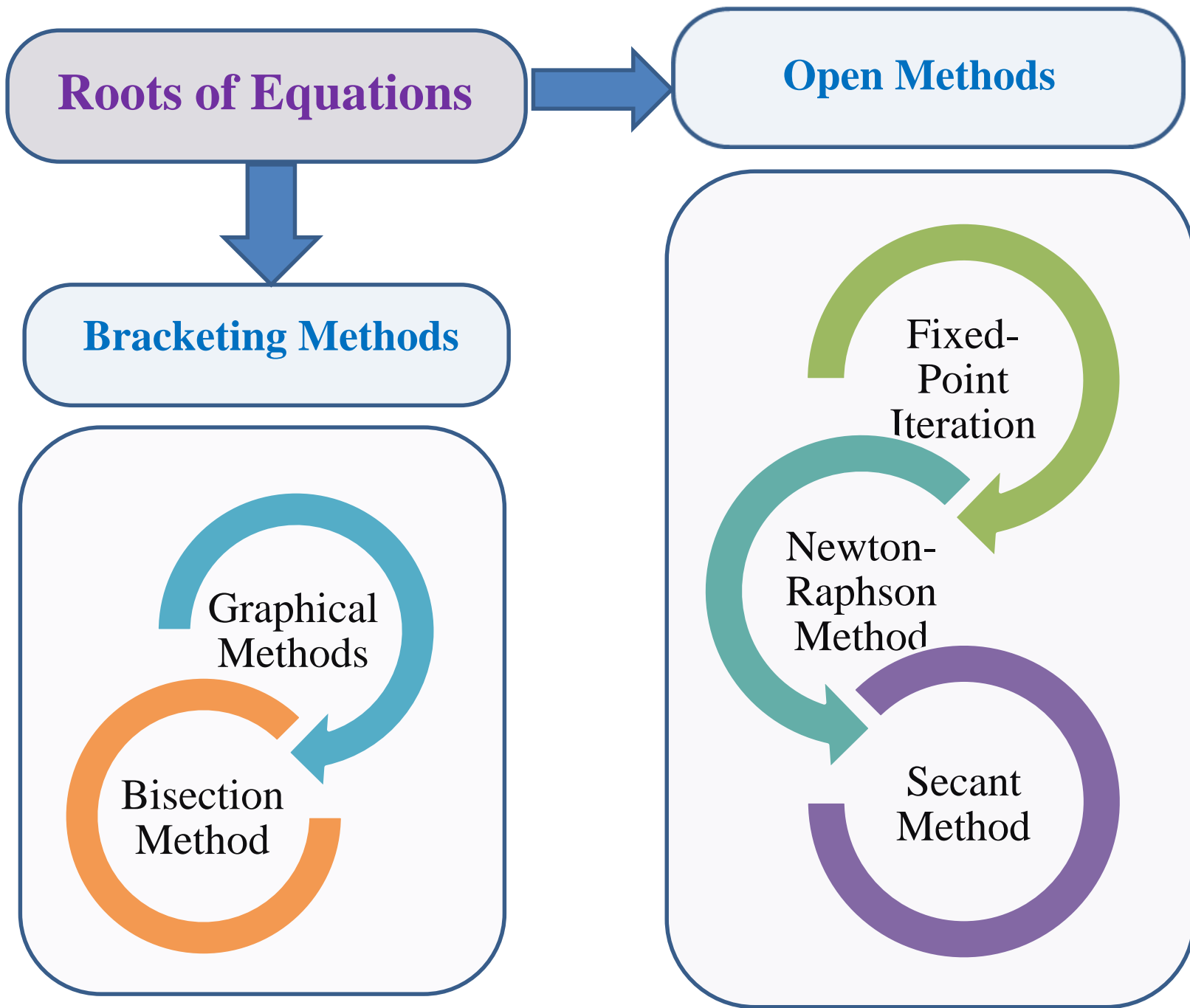
Chapter 5. Bracketing Methods

Lecture 4

Graphical Methods

5.1

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Equations Can Be:



Algebraic

Transcendental

Explicit

Implicit

Algebraic Equations

Expressed in form of i th order polynomial

Transcendental Equations

Equations that are not algebraic (e.g trigonometric, exponential, logarithmic function)

Explicit

Unknown dependent variable on left side of equation, known values on right side

$$v = \frac{gm}{c} (1 - e^{-ct/m})$$

Implicit

Unknown variable cannot be isolated on left side of equation

Overview

- **Bracketing vs Open Method**

Bracketing Method

Open Method

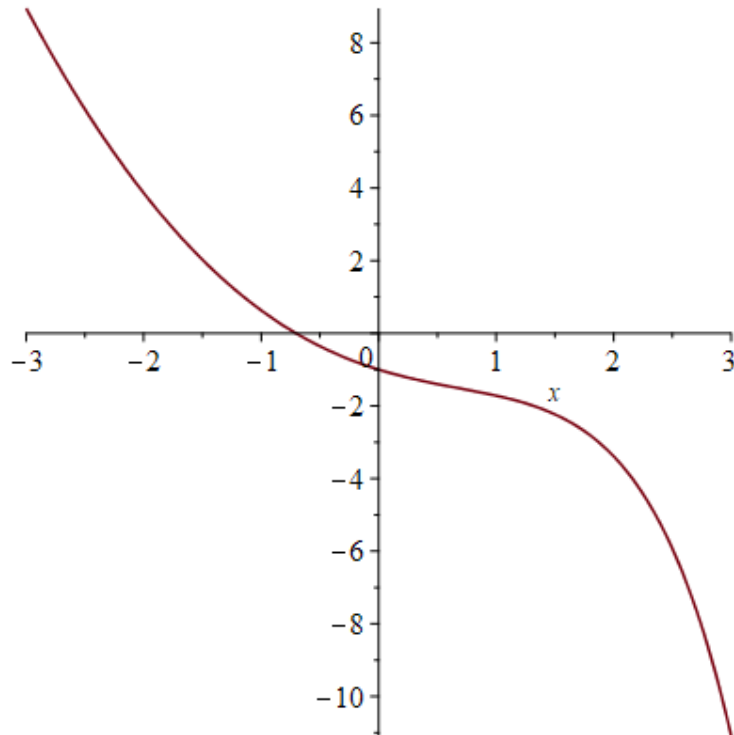
Graphical Methods

Main Fact:

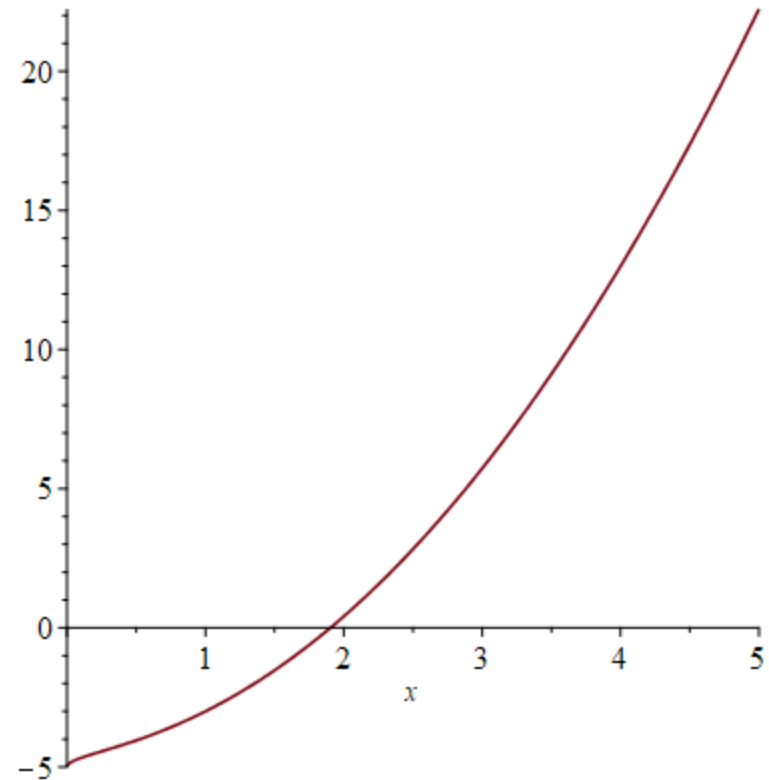
Pros and Cons of Graphical Methods

Convenient to graph functions using math software, i.e. Matlab, Maple, etc.

$$f(x) = x^2 - e^x$$



$$f(x) = x^2 + \sqrt{x} - 5$$

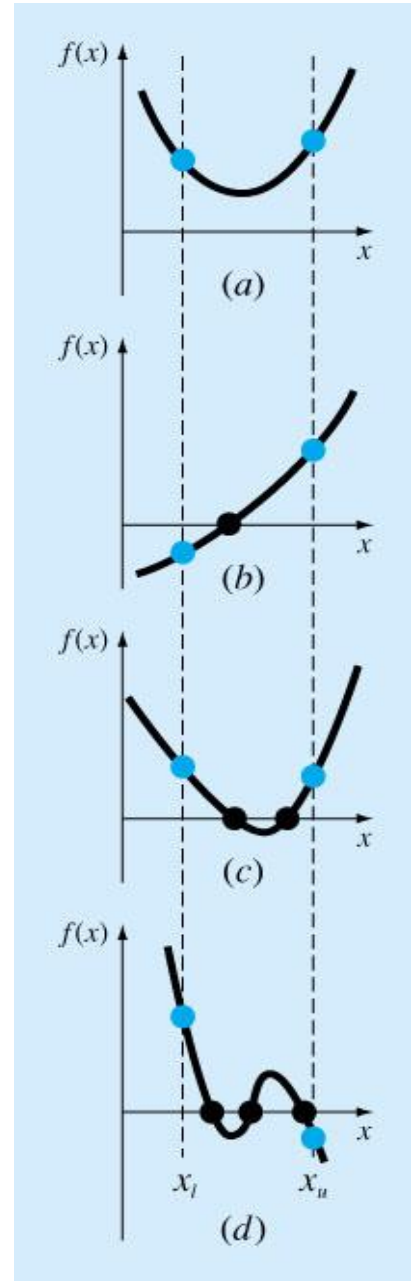


Graphical methods can predict number of roots, approximate location of roots (starting point for analysis)

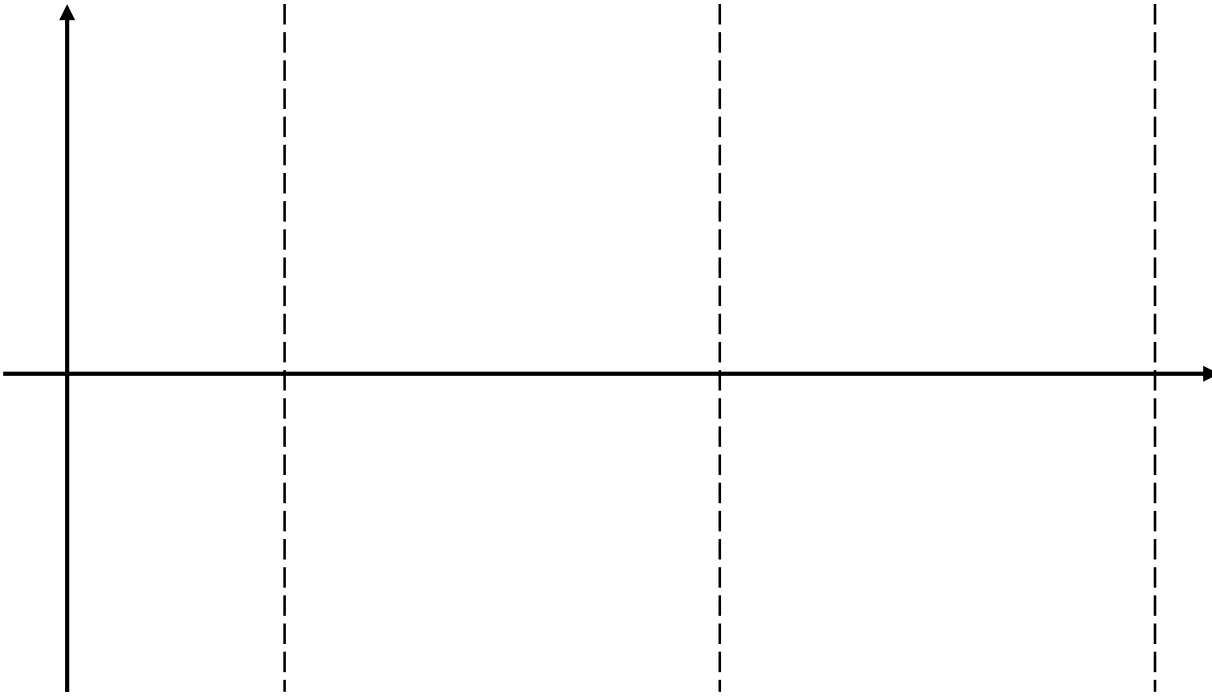
Graphical Methods

Rules of Thumb for Roots Prediction

- 1.
- 2.
3. Exceptions



EXAMPLE Find all non-zero, positive roots of $\tan(x) = -\frac{x}{2}$



Next Session:

Bracketing and Open Methods