The University of Memphis
Department of Mathematical Sciences

MATH 4721-6721 **Numerical Analysis** **Spring 2015**

Instructor: Dr. Thomas Hagen
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Class Time/Location: **TR 1:00pm to 2:25pm, Dunn Hall 107**

Office Hours: **By appointment TR 8:45am to 9:30am in Dunn Hall 367**
(If you show up without appointment, I might not be in my office.)

Text: **Numerical Methods** by G. Dahlquist and Å. Björck, Dover Publications; Reprint edition (April 25, 2003), **ISBN-13:** 978-0486428079
Other free online sources will be announced in class.

Course description: This course will focus on two main objectives: Mathematical derivation of computational methods ("recipes") and a thorough analytical assessment of a method's usefulness and potential failures. Standard techniques from Calculus and Linear Algebra used in the course include the Mean Value Theorem, Taylor expansion, and Gauβ elimination.
Topics covered include: Interpolation and approximation; numerical differentiation and integration; numerical linear algebra; nonlinear equations; differential equations.

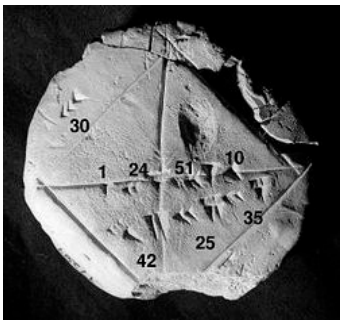

Figure: Approximating the square root of 2 (Babylonia, ca. 1700 BC)

Prerequisites: **Calculus I & II** or equivalent; basic knowledge in **Linear Algebra** (matrices and linear equations, rank and null space, invertibility); **programming language, preferably MATLAB**

Grades: There will be two take-home tests plus the final exam, each worth the same. The grade range is from A to F. The plus-minus system will be used. Homework and participation will be factored into your final grade.

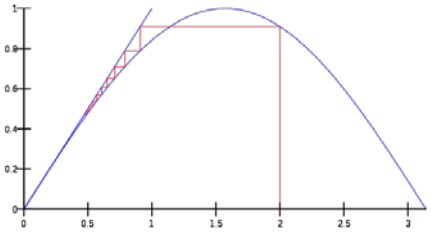
Figure: A fixed-point iteration for the equation sin x = x

Work: Homework will usually be given every other week and will be due a week later. Homework should be written out in a clear fashion and **MUST NOT** be submitted in the form of loose sheets. Late work will **NOT** be acceptable.

Undergraduate level: You may choose to focus on either analytical or computational problems. Grades will be weighted accordingly.

Graduate level: You will be held to a higher standard and should expect to work on both analytical and computational problems.

December 8, 2014