



Mathematics and Computers:

How Can Mathematical Software Help Mathematicians to Test and Prove Their Theories? Success Stories and Examples

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Description and Rationale

Many professional mathematicians, computer scientists and engineers use mathematical software to test their theories and experiment with various mathematical tools. These programs include Wolfram Mathematica (Wolfram Alpha), Maple, Matlab, GeoGebra, Cabri, PhotoMath etc. Nowadays, the circle of people who have access and regularly use this technology has expanded dramatically. In the current Workshop the use of mathematical software will be discussed from historical, theoretical, practical perspectives. Many elementary examples from the presenter's diverse research in Analysis, Geometry and Number theory will be presented. The audience will also have the opportunity to try their skills in using these free resources.

Intended Goals and Outcomes

The main goal is familiarize and popularize the audience with the mathematical software that can boost the listener's efficiency in using the techno- mathematical tools. By seeing concrete examples from various branches of mathematics one can better imagine what he or she can do with such tools.

Sometimes, for non-mathematicians the part of their research where they need to use some mathematical analysis involves some unpleasant moments because of complexity or inability to apply the knowledge. Mathematical software, if used consciously, can make these moments more enjoyable and productive. We mathematicians like to say "an idea used twice is already a method". So, this workshop will be all about ideas and the listeners will just need to use them again to transform them into methods.

Intended Audience

The intended audience for this workshop consists of curious undergraduate and graduate students, mathematicians and computer scientists who want to learn more about the experience of other mathematicians, professionals who want to know more about the mathematical software and how it works, anyone who wants to expand their horizon and knowledge.

Maximum number of attendees: 40

Format and Outline

Time	Activity	Outcome
30 min	History of Using Computers in Mathematics and the future	Better understanding of what was done before and what comes next
30 min	Examples from my experience of using mathematical software.	Concrete examples expand horizon of listeners and inspire them to be an example themselves
30 min	Practical part where I will propose to the listeners some examples to test certain theories using the software. These will be small pieces of easy to understand mathematics that they can discover using the technology	This part will help participants use what they learned from the workshop. This part will be a little noisy and I will be the one who listens and they will be those who talk.

Requirements and Resources

Attendees are expected to bring a laptop.

Organizers' Bios and Contacts

Name: Yagub Aliyev, PhD

Affiliation: ADA University, School of IT and Engineering

Expertise: Mathematical Analysis, Geometric inequalities, Sturm-Liouville Theory, Mathematical Software, $3x+1$ Problem

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Brief Bio: I did my PhD in Baku State University and I taught in several universities (Baku Engineering University, UFAZ, ASOIU, ADA) since 2005. During this time I gave lectures in many branches of modern mathematics. During the last few years I was more interested in teaching mathematics to non-mathematicians. My current listeners include the students from the departments of Computer Engineering, Computer Science and Information Technologies. My research fields include Sturm-Liouville Theory, Geometrical Inequalities and History of Mathematics.