Introduction

Prior Knowledge

Prior knowledge in mathematics (and statistics) of students of the master programme in *economics* differ heavily:

- Students with courses in mathematics with a total of 25 ECTS points (or more) in their bachelor programme.
- Students who did not attend any mathematics course at all.

Prior knowledge differ in

- Basic *skills* (like computations with “symbols”)
- *Tools* (like methods for optimization)
- Mathematical *reasoning* (proving your claim)

Knowledge Gap

The following problems cause issues for quite a few students:

- Drawing (or sketching) of graphs of functions.
- Transform equations into equivalent ones.
- Handling inequalities.
- Correct handling of fractions.
- Calculations with exponents and logarithms.
- Obstructive multiplying of factors.
- Usage of mathematical notation.

Presented *"solutions"* of such calculation subtasks are surprisingly often *wrong*.

Learning Objectives

This **bridging course** is intended to help participants to

- *close* possible knowledge gaps, and
- *raise* prior knowledge in **basic** mathematical **skills** to the *same higher* level.

Further courses:

- *Foundations of Mathematics* (Msc Economics):

  Essential mathematical *tools*.
  (matrix algebra, Taylor series, implicit functions, static optimization, Hessian, Lagrange multiplier, difference equations, . . .)

- *Mathematics 1 and 2* (science track only):

  Advanced (new) tools and mathematical reasoning.

Learning Methods

- *Revision* of mathematical notions and concepts by the instructor.
- Solve problems *collectively* during the course.
- Solve *homework problems*.
  Solutions are discussed during the next course.
- The subject matter may not be presented in a linear way.
- There will be *no exams*.
- For a positive grade (*"erfolgreich teilgenommen"*) you have to be **present** in at least **8 units**.

Solutions of Problems

- A problem is **solved** when the problem question is *answered*.
- It is *not sufficient* when you just present the computations that are *necessary* to answer the question.
- In particular, fragments of computations that start and end at some point are not considered as correct solution of a (homework) problem.
- You have to show that you can draw the right conclusions from your computations.

Maxima – Computer Algebra System (CAS)

Maxima is a so called **Computer Algebra System** (CAS), i.e., one can

- handle algebraic expressions,
- solve (in-) equalities with parameters,
- differentiate and integrate analytically,
- handle abstract matrices,
- plot univariate and bivariate functions,
- ...

Program *wxMaxima* provides a GUI:

`http://wxmaxima.sourceforge.net/`

The manuscript *Introduction to Maxima for Economics* can be downloaded from the webpage of this course.

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Fundamental Theorem of Calculus

May you do well!