
History of Mathematics

Math 395 Spring 2010
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Fowler 310 MWF 10:30am - 11:25am
<http://faculty.oxy.edu/ron/math/395/10/>

Class 1: Wednesday January 20

TITLE Introduction to History of Mathematics

CURRENT READING Katz, §1.1

Homework Assignments due Friday January 22

HW #0: Automathography. E-mail me a three-paragraph (at least 200 words) “automathography” of yourself. Automathography is a neologism composed of the word autobiography and math, and it is basically a a biography of your mathematical self, written by you. Tell me about the courses you have taken, what your favorites were, what you find hardest. Explain what your mathematical interests are, and what you plan to do after graduation. Reveal why you signed up for this course and what you expect to get out of it. If your aims for taking this course are different from the stated goals in the syllabus, please let me know. If you have any anxieties about this course, or any special problems or needs, let me know. You are encouraged to be creative in your response; don’t be pedantic and just answer the questions asked above; include whatever you wish.

SUMMARY

In today’s class we shall go through an overview of the class, discuss the syllabus, and begin our discussion of the origin of mathematics.

1. Origin of Mathematics

The origins of mathematics accompanied the evolution of social systems. Many, many social needs require

- counting,
- calculations,
- measurement

EXAMPLE

- The worth of a herdsman cannot be known unless some basics facts of counting are known.
- An temple cannot be built unless certain facts about triangles, squares, and volumes are known.
- An inheritance cannot be distributed unless certain facts about division (fractions) are known.

From practical needs such as these, mathematics was born.

One view is that the core of early mathematics is based upon two simple questions.

- **How many?**
- **How much?**

This is the *cardinal* number viewpoint.

Ordinals

Another view is that mathematics may have an even earlier basis on ordinals used perhaps for rituals in religious practices or simply the pecking order for eating the fresh game.

Such basic questions are thus:

- Who is first, etc?
- What comes first, etc?

We will take the cardinal numbers viewpoint in our discussion.

HOW MANY?

Systems of enumeration.

Primitive:

notches, sticks, stones

Egyptians:

symbols for 1, 10, 100, 1,000, ... 1,0000,000.

Babylonians:

two symbols only--cunieform

Greeks:

alphabetical denotations, plus special symbols

Roman:

Roman numerals, I,V,X,L,C,D,M..

Arabs:

Ten special symbols for numbers.

Modern:

Ten special symbols for numbers.

Methods of cipherring.

Devices:

Abacus, counting boards.

Symbolic:

Arithmetic.

HOW MANY?

Bases for numbering systems

- binary – early
- ternary – early
- quinary – early
- decimal
- vigesimal
- sexagesimal
- combinations of several

HOW MUCH?

When counting or asking how many, we can limit discussions to whole positive integers. When asking how much, integers no longer suffice.

Examples:

Given 17 seedlings, how can they be planted in five rows?

Given 20 talons of gold, how can they be distribution to three persons?

Given 12 pounds of salt, how can it be divided into five equal containers?

When asking how much we are led directly to the need of fractions.

HOW MUCH?

Another how much question is connected with measurement.

- Construction. To build graneries, or ovens to bake bread, or pyramids, or temples we need formulas for quantity, or area or volume.
- Planting. To divide arable plots we need formulas for plane area and those for seasons.
- Astronomy. To study the motions of stars we need angular and temporal measurment.
- Taxes and commerce. To properly assess taxes, we need ways to compute percentages (fractions).