The Articulation of Mathematics:
An Everyperson Pragmatic/Constructive Approach to The Philosophy of Mathematics
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Disclaimer

This only sketches an approach to the philosophy of mathematics- it is presented as beginnings after a short period of contemplation-

a little over 25 years.

As with most philosophy-

Expect more questions than answers.

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Some Personal History- briefly

- Undergraduate
  - Math
  - Philosophy (Jean Van Heijenoort)
  - Political Science (Eugene Meehan)
- Graduate
  - Math- Algebraic Topology/ Categorical Approaches (Edgar Brown Jr.)
  - History of Mathematics (Michael Spivak)
  - Law – and Legal History
    - Common disciplinary aspects of Mathematics and the Law
- Post-graduate Studies and Activities
  - Math Economics/ Game theory (Yale)
  - Nonstandard Analysis (Yale)
  - POM (NEH at UNC- Michael Resnik)
  - Calculus Reform (Jerry Uhl and David Tall)
  - History of Math (HOM SIGMAA)
  - POM SIGMAA

The philosophy of mathematics has often taken mathematics as *a realm of discourse that is fixed*.

The **investigation** of this realm is what working mathematicians take as their task. This work leads to **results and reports** on

- what they have ascertained and
- the methods used in these investigations.

Communications accompanying these reports and results allow others

- to achieve comparable experiences of understanding or
- to accept the results for further investigations.

An alternative "constructive" view:

The mathematical realm is **dynamic and changing.**

The task of working mathematicians involves **the articulation of this realm, a pragmatic effort of developing and relating concepts
- tools useful for analyzing this realm.**

This work leads to results and reports on

– what they have found useful and

– the methods used in this process.

Communications accompanying these reports and results allow others

– to achieve and extend comparable conceptual frameworks

– to accept the frameworks for further development.

Serenity for Working Mathematicians

- Serenity to accept what we cannot change.

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- **Courage to change what we can.**

Serenity for Working Mathematicians

- Serenity to accept what we cannot change.
- Courage to change what we can.
- **Wisdom to know the difference.**

"Philosophy of Acceptance" for a Working Mathematician

■Some mathematical objects exist.

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- Some mathematical objects exist.

- Ontological commitments come from personal and common experiences.

- **Differences and conflicts in ontological beliefs and viewpoints are evidence for not looking for a universal ontological foundation.**

Application to Philosophical Questions:
No answer key provided.

Is mathematics about a reality or is it about conventions?

Application to Philosophical Questions:

No answer key provided.

Is mathematics static or dynamic?

Application to Philosophical Questions:
No answer key provided.

Is mathematics absolute or contextual?

Application to Philosophical Questions:
No answer key provided.

Is the process of mathematics one of discovery or creation?

Application to Philosophical Questions:
No answer key provided.

Is mathematics symbolic or conceptual?

More Philosophical Questions

What are numbers?

How do we recognize a number as being a number?

Are real numbers different in their nature from natural numbers? integers? rational numbers? algebraic numbers? complex numbers?

More Philosophical Questions

What are sets?

Do infinite sets exist?

Is there a meaningful distinction made between potential or actual infinite sets?

More Philosophical Questions

What is the role of structure and form in mathematics?

More Philosophical Questions

What are groups, rings, fields, vector spaces, topological spaces, measure spaces, banach and hilbert spaces, categories?

More Philosophical Questions

Student: "Would this all be true for banach spaces?"

Instructor: "Show me a banach space."

Response for Everyperson

Mathematics **evolves** in a **dynamic** process of <u>articulation</u>.

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The result of work in mathematics is **an inter-related web or fabric of information-data and concepts.**

What survives in mathematics is a result of a **pragmatic standard founded on** scientific empiricism and **consistency**.

Thanks
The End!

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Questions?

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