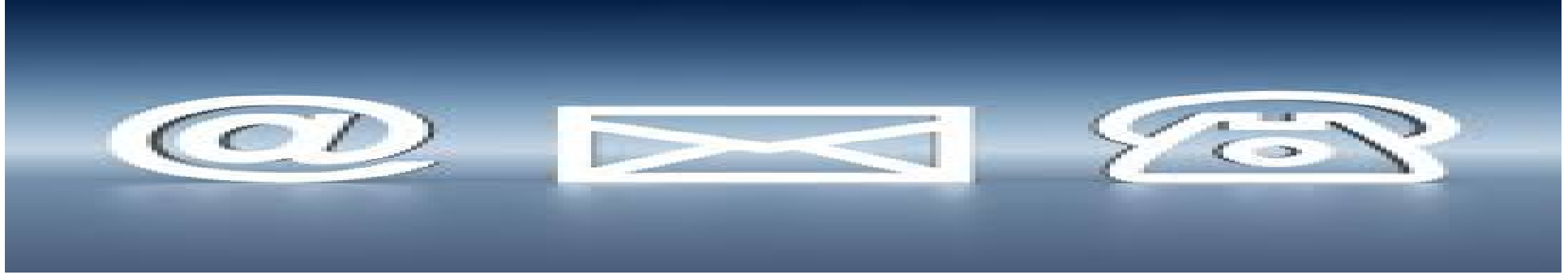

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PHILOSOPHY OF MATHEMATICS

QUESTIONS

1. What is Mathematics?
2. Are the Mathematical results invented or discovered?
3. What is meant by a proof?
4. What are numbers?
5. What is the problem with the Axiom of Choice?
6. What are the strengths and weakness of the axiomatic method?
7. What is Pure Mathematics and what is Applied Mathematics?

MORE QUESTIONS

9. Is the proof of the Four Colour Theorem acceptable?

10. What is meant by the existence in Mathematics? How is it to be proved?

11. How mathematics differs from science?

13. Can we accept the method of reduction ad absurdum?

14. What is the proof for the Principle of Mathematical Induction?

15. The relation between intuition and rigor- in research, teaching and exposition

15.Definition of complex numbers a+ib

16. Definition of rational numbers

17. The concept of infinitesimal. What is it?

18. What is the relation between mathematics and the physical world around us?

19. What is the difference in the philosophies of Indian mathematician and others

20. What is the reason behind the problems of teaching Mathematics. Mathophobia?

21. Are the mathematical objects real?

22.Why some numbers called real and some imaginary?

23.Are the real numbers really real?

TWO APPROACHES

1.Constructive

2. Analytic

FOUNDATIONS OF MATHEMATICS

RELATIVE TRUTH

- Distinction between Science and Mathematics

- Tautology

PLATONISM

Mathematical objects are real. Their existence is an objective fact, quite independent of our knowledge of them

Rene Thom

Kurt Godel

FORMALISM

D. Hilbert

There are no mathematical objects

Mathematics just consists of axioms, definitions and theorems

Mathematics is a game with symbols subject to certain rules

CONSTRUCTIVISM

- The genuine mathematics is only what can be obtained by a finite construction.

INTUITIONISM

- L.E.J. Brouwer
- L. Kronecker
- H. Poincare

DAVIS P.J. & HERSH R.

Most writers on the subject seems to agree that the typical working mathematician is a Platonist on weekdays and a formalist on Sundays. That is, when he is doing mathematics he is convinced that he is dealing with an objective reality whose properties he is attempting to determine. But then, when challenged to give a philosophical account of this reality, he finds it easiest to pretend that he does not believe in it after all.

The Mathematical Experience, Penguin Books 1983.

BERTRAND RUSSELL

Mathematics and logic, historically speaking, have been entirely distinct studies. Mathematics has been connected with science, logic with Greek. But both have developed in modern times; logic has become more mathematical and mathematics has become more logical. The consequence is that it has now become wholly impossible to draw a line between the two; in fact the two are one

LOGIC

LOGICISM

- Russell
- Frege

Principia Mathematica, B.Russell& A.N.Whitehead

LOGICISM

Logicism is a programme in the philosophy of mathematics, comprising one or more of the theses that — for some coherent meaning of 'logic' — mathematics is an extension of logic, some or all of mathematics is reducible to logic, or some or all of mathematics may be modelled in logic.[1] Bertrand Russell and Alfred North Whitehead championed this programme, initiated by Gottlob Frege and subsequently developed by Richard Dedekind and Giuseppe Peano.

Mathematics is an extension of logic

LAW OF EXCLUDED MIDDLE

Every statement is either true or false but not both.

BUDHISM

Nagarjuna (2nd or 3rd Century C.E.):

Tetralemma

Anything is either true, or not true or both true and not true or neither.

NAGARJUNA

JAINISM

- Syad Vada
- Saptabhangi
- Bhadrabahu (c. 433–357 BCE).

SAPTABHANGI

- Arguably, it (that is, some object) exists (*syad asty eva*).
- Arguably, it does not exist (*syan nasty eva*).
- Arguably, it exists; arguably, it doesn't exist (*syad asty eva syan nasty eva*).
- Arguably, it is non-assertible (*syad avaktavyam eva*).
- Arguably, it exists; arguably, it is non-assertible (*syad asty eva syad avaktavyam eva*).
- Arguably, it doesn't exist; arguably, it is non-assertible (*syan nasty eva syad avaktavyam eva*).
- Arguably, it exists; arguably, it doesn't exist; arguably it is non-assertible (*syad asty eva syan nasty eva syad avaktavyam eva*).

- T F U

  TF TU FU TFU

MANY VALUED LOGICS

In logic, a **many-valued logic** (also **multi-** or **multiple-valued logic**) is a propositional calculus in which there are more than two truth values. Traditionally, in Aristotle's logical calculus, there were only two possible values (i.e., "true" and "false") for any proposition. Classical two-valued logic may be extended to ***n*-valued logic** for *n* greater than 2. Those most popular in the literature are three-valued (e.g., Łukasiewicz's and Kleene's, which accept the values "true", "false", and "unknown"), the finite-valued (finitely-many valued) with more than three values, and the infinite-valued (infinitely-many valued), such as fuzzy logic and probability logic.

FUZZY LOGIC

L.A. ZADEH

IGNORANCE

BERTRAND RUSSELL
1950

The central problem of our age is how to act decisively in the absence of certainty.

- Probability Theory
- Various types of Generalised Set Theories

SET THEORIES

- Fuzzy Set Theory
- Rough Set Theory
- Soft Set Theory
- Multi Sets
- Nonstandard Set Theory
- Alternative Set Theory