

# Handout for MATH 036: Study Questions for “Mathematics as Metaphor”

Alp Uzman

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- (i) Who is Manin’s audience in this article? Find the Fields medalists of the corresponding year.
- (ii) Explain how the word “metaphor” can be used in a technical sense.
- (iii) Get acquainted with Arrow’s Dictator Theorem that Manin mentions. It will come up when we are discussing voting theory, but it will be called Arrow’s Impossibility Theorem.
- (iv) Who is Nicolas Bourbaki, and what does his motto “Dépuis les Grécs, qui dit Mathématiques, dit démonstration” stand for? Observe that the “Workload” section in our syllabus is a watered-down version of what the motto stands for.
- (v) Compare the following words: proof, evidence, justification, argument, explanation, demonstration.
- (vi) What is “rigor” and a “rigorous proof”? Observe that rigor, like rigid, comes from the Latin verb *rigere*, which is translated as “to be stiff”. Is a rigorous proof possible at all, considering the fact that mathematicians—or humanity, if you will—chooses the axioms to abide to. Flexibility seems to be pulled out of arguments and repackaged as “axioms”, but it is still present. Also recall the study question for Halmos’ article regarding the relation between mathematics and play.