Penn State, UP Fall 2017

Handout for MATH 036: Study Questions for "Mathematics as a Creative Art"

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Halmos

(i) What is the main difference between mathology and mathophysics according to Halmos? What are their advantages and disadvantages? Find examples for both (a la Google, say).

(ii) On pp. 376-377, Halmos declares that "[a] machine might enjoy proving that $1^3 + 5^3 + 3^3 = 153$, and it might even go on to discover that there are only five positive integers with the property that the equation indicates $(1, 370, 371, 407)$, [...]". What is that property? (Hint: The answer has to do with narcissism.)

(iii) What are the three celebrated Greek problems Halmos mentions?

(iv) The phrase "ontogeny recapitulates phylogeny" Halmos cites on p. 379 belongs to the study of evolutionary biology. How is it justify to use it in a mathematical context?

(v) Can one think of mathematics as a game, or as play? (See Huizinga's "magic circle", e.g. at https://en.wikipedia.org/wiki/Magic_circle_(virtual_worlds))

(vi) Are you a problem-solver or theory-creator (in life in general)? Which character trait is more valuable?

(vii) Get acquainted with the tennis tournament problem on p. 382 by considering different numbers of tennis players.

(viii) Are the following two identifications justified: problem-solver $\sim$ mathophysicist, theory-creator $\sim$ mathologist?

(ix) See the note on p. 386: "the longer formulation is not only awkward, it is also incomplete". What is the verbal formulation actually missing?

(x) Halmos declares on p. 387 that "chess is completely deterministic". In what sense is chess deterministic? Surely at the beginning of the game there are a very big number of possibilities on how the game might develop, which is the reason why chess is so well-regarded.

(xi) What are the criteria for quality in mathematics, according to Halmos?