

1958

1958-1. Let us consider a partition of the closed interval $[0; 1]$ into three intervals $\Delta_1, \Delta_2, \Delta_3$ and rearrange them in the order $\Delta_3, \Delta_2, \Delta_1$. Explore the resulting dynamical system $[0; 1] \rightarrow [0; 1]$: is it true that the mixing rate and similar ergodic characteristics are the same for almost all lengths $(\Delta_1, \Delta_2, \Delta_3)$ of the partition intervals?

An analogous question may be asked for n intervals and for arbitrary permutations as well (changing the orientation of some intervals also being allowed).

1958-2. Let all four faces of a tetrahedron have equal areas. Prove that the lengths of opposite edges are equal (and all faces are congruent!). *The idea is quite simple: cut along three edges from a vertex and develop.*

1958-3. Find a multidimensional version of the Hilbert conjecture on the number of limit cycles of a polynomial vector field. *For instance, one is interested in the number of integral curves connecting two algebraic or invariant manifolds and sufficiently "monotone."*