

鹿児島大学数理情報科学談話会

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日時：2016年10月14日（金）16:30 - 17:30

場所：理学部2号館4室

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題目：Two elementary analytic evaluations of $\zeta(2)$ found by Euler and another one he missed

Abstract:

Leonhard Euler entered the fame hall of mathematics "dramatically" by solving the long outstanding Basel problem, i.e. the evaluation of (in modern terms) $\zeta(2)$ to $\pi^2/6$.

There are excellent historic and mathematical surveys (which I will rather shortly repeat) on his achievements from the beginning until the culminating evaluation of all the values $\zeta(2k)$.

For the last result, he used what he called "la considération des racines d'une équation infinie" and could not really justify. (Only a century later, Weierstrass developed the subject of product formulas for holomorphic functions). For that reason, Euler first convinced colleagues by presenting an "elementary" proof for $\zeta(2)$ and tried (unsuccessfully) to find similar ways to the other values.

The focus of my talk lies on the presentation of his arguments and to show that one can more or less by the same procedure get another elementary proof found by him later. Finally, a new approach by Paul Levrie (Mathematical Intelligencer 2011) can also be subsumed to the same idea.

I also discuss the question which "minimal" prerequisites of calculus one has to impose in order to make Eulers reasoning "exact" for modern standards in the classroom.

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