

Number theory, partitions, q -series and related research
($npqr^2$)

SEMINAR

Properties and applications of Apéry-like
numbers

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Time: 2.30 – 3.30 pm

Venue: MME Journal Room, NIE7 #03-16

<http://math.nie.edu.sg/pctoh/Gettinghere.jpg>

Abstract:

Apéry-like numbers are special integer sequences, going back to Beukers and Zagier, which are modelled after and share many of the properties of the numbers that underly Apéry's proof of the irrationality of $\zeta(3)$. Among their remarkable properties are connections with modular forms and so-called supercongruences, some of which remain conjectural. In the course of several examples, we demonstrate how these numbers and their connection with modular forms feature in various, apparently unrelated, problems. The examples are taken from personal research of the speaker and include the theories of short random walks, binomial congruences, series for $1/\pi$, and positivity of rational functions. We go on to introduce a multivariate extension of the Apéry numbers by realizing them as the diagonal coefficients of a simple rational function in four variables. Finally, we prove that supercongruences hold for all coefficients of this rational function. This fresh perspective on supercongruences extends to other Apéry-like numbers.

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