



Yet another proof of the Nualart-Peccati criterion

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In 2005, Nualart and Peccati showed that, surprisingly, the convergence in distribution of a normalized sequence of multiple Wiener-Itô integrals towards a standard Gaussian law is equivalent to convergence of just the fourth moment to 3. Recently, this result has been extended to a sequence of multiple Wigner integrals, in the context of free Brownian motion. The goal of the present paper is to offer an elementary, unifying proof of these two results. The only advanced, needed tool is the product formula for multiple integrals. Apart from this formula, the rest of the proof only relies on soft combinatorial arguments.

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