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Combinatorial characterizations of perfect secrecy

We discuss entropy in classical information theory and Shannon's concept of perfect secrecy in cryptography. Examples include the Vernam cipher, also known as the one-time pad. Under suitable conditions we prove the equivalence of perfect secrecy with a well-known class of combinatorial structures. We then proceed to discuss analagous questions in quantum information theory. This in turn leads to a much-studied and fundamental classical question in combinatorics dating back to Euler. We conclude, time permitting, with some "philosophical musings".