Why are all dualities conformal? Theory and practical consequences SEYYED MOHAMMAD SADEGH VAEZI, ZOHARN NUSSINOV, Washington University, GERARDO ORTIZ, Indiana University, Bloomington — We relate duality mappings to the "Babbage equation" F(F(z)) = z with F a map linking weak to strong coupling theories. Under fairly general conditions F may only be a specific conformal transformation of the fractional linear type. This deep general result has enormous practical consequences. For example, one can establish that weak and strong coupling expansions are trivially related, i.e., one needs to generate only one of them while the other is automatically determined through a set of linear constraints. The latter partially solve or, equivalently, localize the computational complexity to a simple fraction of the coefficients, and as a bonus those relations encode non-trivial equalities between different geometric constructions. We illustrate our findings by examining various models including, but not limited to, ferromagnetic and spin-glass type Ising models on hypercubic lattices.

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