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Persistence for a class of order-one autoregressive processes and Mallows-Riordan polynomials by Kilian Raschel

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Abstract. We establish exact formulae for the (positivity) persistence probabilities of an autoregressive sequence with symmetric uniform innovations in terms of certain families of polynomials, most notably a family introduced by Mallows and Riordan as enumerators of finite labeled trees when ordered by inversions. The connection of these polynomials with the volumes of certain polytopes is also discussed. Two further results provide factorizations of general autoregressive models, one for negative drifts with continuous innovations, and one for positive drifts with continuous and symmetric innovations. The second factorization extends a classical universal formula of Sparre Andersen for symmetric random walks. Our results also lead to explicit asymptotic estimates for the persistence probabilities. This is a joint work with Gerold Alsmeyer, Alin Bostan and Thomas Simon (Adv. Appl. Math., 2023).