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Statistics of convex polygons and approximation of convex curves.

Let Π be the set of convex polygons on $\mathbf{Z}_+^2$ starting from the origin and with non-negative tangent of edges, and $\Pi(m_1, m_2)$ its subset with the fixed right end (m_1, m_2). The asymptotics of the ensemble $\Pi(m_1, m_2)$ as $m_2/m_1 \to c$ has been studied by A. M. Vershik, I. Bárány, Ya. G. Sinai and others. The idea of Sinai's method is to represent the probability distribution P_{m_1,m_2} on $\Pi(m_1, m_2)$ as that induced by a certain distribution Q_{z_1,z_2} on Π (with appropriate parameters $z_1, z_2 \approx 1$), conditioned by fixing the right end. We obtain a "perturbation" version of the previous results by letting the parameters z_1, z_2 be functions on $\mathbf{Z}_+^2$. We also apply Sinai's method to convex polygon approximations of convex C^2-curves. In particular, McMillan's theorem with correction terms and the CLT are proved.