Motivated by the recent breakthrough in Toeplitz’s rectangular peg problem in [J. E. Greene and A. Lobb, Ann. Math. (2) 194, No. 2, 509–517 (2021; Zbl 1472.51010)], the author presents a nice survey, with proofs, of the main results obtained in the general area of inscribing simple geometrical figures in Jordan curves.

It contains proofs of M. D. Meyerson’s theorem [Fundam. Math. 110, 1–9 (1980; Zbl 0372.57003)], that all but at most two points of an arbitrary Jordan curve are vertices of an inscribed equilateral triangle, of Vaughan’s theorem, presented during a lecture at the University of Illinois at Urbana-Champaign in 1977, that every Jordan curve has an inscribed rectangle, a proof different from Vaughan’s, one not using algebraic topology, and of the Greene-Lobb theorem mentioned above. The latter takes Shevchishin’s theorem, that there is no smooth Lagrangian embedding of a Klein bottle in $\mathbb{R}^4$, as a fact, given that “all the proofs rely on some symplectic geometry machinery that is beyond the scope of the article.” It is also mentioned that J. E. Greene and A. Lobb have extended their result in an arXiv preprint to: “Any cyclic quadrilateral (up to rotation and scaling) can be inscribed in any smooth Jordan curve” [Cyclic quadrilaterals and smooth Jordan curves, Preprint, arXiv:2011:05216].

Reviewer: Victor V. Pambuccian (Glendale)

MSC:
51M04  Elementary problems in Euclidean geometries
53D12  Lagrangian submanifolds; Maslov index

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References:
[9] C. Hugelmeyer, Every smooth Jordan curve has an inscribed rectangle with aspect ratio equal to $\sqrt{3}$, 1803:07417 (2018)


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