

"EISENSTEIN, G.

Über die Irreductibilität und einige andere Eigenschaften der Gleichung, von welcher die Theilung der ganzen Lemniscate abhängt (+) Über eine allgemeine Eigenschaften der Gleichung, von welcher die Theilung der ganzen Lemniscate abhängt, nebst Anwendu... - [Eisenstein's Criterion]

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Berlin, G. Reimer, 1850. 4to. Bound in later marbled wrappers, as extracted from "Journal für die reine und angewandte Mathematik, 28 Band, 4. Heft, 1844". Very fine and clean. Pp. 160-179" Pp. 224-274 Pp. 275-287 [Entire issue: 289-380 + 2 folded plates].

Commentaire : First publication of lemniscate function and Eisenstein's Criterion, one of the best known irreducibility criteria of polynomials. It is often seen referred to as the Schönemann-Eisenstein. Euler had introduced and studied the arc length of the lemniscate in the 18th century, this work laying the ground work for the later development of elliptic functions. The lemniscate function expresses the parameter of the lemniscate in terms of its arc-length. It can be extended to complex values of the parameter, and it then makes sense to ask for the points which divide the lemniscate into m equal parts, where m is a Gaussian integer (a complex number). Abel had shown that the determination of these points reduced to finding the roots of a certain polynomial equation. A crucial point in Eisenstein's extension of Abel's work described in the present papers was to prove that this polynomial is irreducible. Eisenstein developed his eponymous criterion to establish this (although today it is most familiar when applied to the more elementary case of a polynomial with ordinary integer coefficients).

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