

On the integration of algebraic functions

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We discuss four specialization questions around the topic of the title. The first three do not seem to have been stated explicitly in the literature, and the first two of these are relatively easy to answer. The last two are still unanswered, but at least the fourth was stated explicitly by James Davenport in 1981, in connexion with “integration in elementary terms”. We show that his answer is wrong, and we describe all possible counterexamples when everything is defined over the field of all algebraic numbers. This is joint work with Umberto Zannier.