Endomorphisms of Two Dimensional Jacobians and Related Finite Algebras

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Abstract. Zarhin proves that if \( C \) is the curve \( y^2 = f(x) \) where \( \text{Gal}_\mathbb{Q}(f(x)) = S_n \) or \( A_n \), then \( \text{End}_\mathbb{Q}(J) = \mathbb{Z} \). In seeking to examine his result in the genus \( g = 2 \) case supposing other Galois groups, we calculate \( \text{End}_\mathbb{Q}(J) \otimes \mathbb{F}_2 \) for a genus 2 curve where \( f(x) \) is irreducible. In particular, we show that unless the Galois group is \( S_5 \) or \( A_5 \), the Galois group does not determine \( \text{End}_\mathbb{Q}(J) \).

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Received by the editors January 4, 2009; revised June 29, 2009.
Published electronically March 18, 2011.
AMS subject classification: 11G10, 20C20.