Journal of Classical Analysis
Volume 25, Number 2 (2025), 185–192
doi:10.7153/jca-2025-25-12

WEIERSTRASS DIVISION POINTS AND THE ETA FUNCTION LAW

PAUL L. ROBINSON

Abstract. New proofs of the celebrated transformation law for the Dedekind eta function come by inspecting pairs of related Weierstrass $\wp$-functions at appropriate division points.

Mathematics subject classification (2020): 11F20, 33E05.
Keywords and phrases: Weierstrass elliptic function, Dedekind eta function.

REFERENCES

[1] T. M. APOSTOL, *Modular Functions and Dirichlet Series in Number Theory*, Graduate Texts in Mathematics **41**, Second Edition, Springer-Verlag, 1990.
[2] J. M. BORWEIN AND P. B. BORWEIN, *A cubic counterpart of Jacobi's identity and the AGM*, Transactions of the American Mathematical Society, **323**, (1991), 691–701.
[3] S. COOPER, *Ramanujan's Theta Functions*, Springer International, 2017.
[4] J. ELSTRODT, *A very simple proof of the eta transformation formula*, manuscripta mathematica, **121**, (2006), 457–459.
[5] N. KOBLITZ, *Introduction to Elliptic Curves and Modular Forms*, Graduate Texts in Mathematics **97**, Second Edition, Springer-Verlag, 1993.
[6] Z. Y. KONG AND L. P. TEO, *An Elementary Proof of the Transformation Formula for the Dedekind Eta Function*, Armenian Journal of Mathematics, **16** Number 4, (2024), 1–22.
[7] J. P. SERRE, *A Course in Arithmetic*, Graduate Texts in Mathematics **7**, Springer-Verlag, 1973.
[8] C. L. SIEGEL, *A simple proof of* $\eta(-1/\tau) = \eta(\tau)\sqrt{\tau/\mathrm{i}}$, Mathematika **1**, (1954), 4.
[9] E. M. STEIN AND R. SHAKARCHI, *Complex Analysis*, Princeton Lectures in Analysis **II**, Princeton University Press, 2003.
[10] E. T. WHITTAKER AND G. N. WATSON, *A Course of Modern Analysis*, Fourth Edition, Cambridge University Press, 1927.

Paper JCA-25-12