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Theorems on Three-Term Relations for Hardy Sum

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Abstract: Some three-term and mixed three-term relations for Hardy sums were given by Goldberg [7]. His proofs are based on Bernd's transformation formulae for the logarithms of the classical Theat-functions. Pettet and Sitaramachandararo [9] proved elementary proofs for all of Goldberg's results and also proved some three-term relations of Dedekind sums. In this paper, some new theorems on three-term relations for hardy sums were found by applying derivative operator to three-term polynomial relation. Furthermore, proofs of the reciprocity relations for Hardy sums are presented in a more concise way from the original proofs of Berndt [2, 3, 4] and Goldberg [7].

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