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Master Thesis Defense

Entitled

THE Q-GAUSS PRODUCT, Q-TRIGONOMETRY VIA LANDEN-LIKE IDENTITIES, AND POSITIVE ALTERNATING Q-SERIES

by

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Abstract

the object of this report is q-series and their relationship with certain special functions. Firstly, Jackson's q-analogue of the Euler gamma function is introduced and a q-analogue for a famous formula of Gauss on products of the gamma function will be presented. Secondly, Jacobi's theta functions will be discussed in details and new Landen-like half argument formulas will be established. As an application, q-trigonometric formulas shall be derived and a new proof for a well-known q-series relation of Jacobi will be given. Thirdly, an extended Bailey transform will be presented, and a variety of new q-series will deduced as a consequence. Some of these new formulas lead to positivity of alternating sums of q-series.

Keywords: q-series, q-gamma function, q-trigonometry, Bailey transform, positivity