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A New Construction of Ewell's Octuple Product Identity

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Abstract

In this article, we establish an octuple product identity motivated by the work of Carlitz and Subbarao in which they use Jacobi's triple product identity only to prove the quintuple product identity and Winkler's identity. Our work turns out to be a new construction of Ewell's octuple product identity. On the other hand, we offer an alternative proof for the octuple product identity by appealing to functional equations satisfied by related infinite products.

Key words : Jacobi's triple product identity; Pentagonal Number Theorem; Euler's Identity; Quintuple Product Identity; Octuple Product Identity; Winkler's Identity