1002-11-235   **Stephen C. Milne*** (`milne@math.ohio-state.edu`), Department of Mathematics, The Ohio State University, 231 West 18th Avenue, Columbus, OH 43210-1174. *New Lambert series formulas for 12 and 20 squares, and multiple basic hypergeometric series.* Preliminary report.

We first discuss how basic hypergeometric series in one and several variables lead to formulas for sums of squares, including our recent work on infinite families of such formulas. After a review of our formulas for 16 and 24 squares, we present our new expansion of $\vartheta_3(0, -q)^{12}$ and $\vartheta_3(0, -q)^{20}$ as 2 by 2 determinants of double power series, where $\vartheta_3(0, q)$ is the classical theta function with j-th term q^{j^2}. We then express the double power series involved as linear combinations of classical Lambert series. The resulting Lambert series expansions here, as well as our earlier analogous 2 by 2 determinant expansions of $\vartheta_3(0, -q)^{16}$ and $\vartheta_3(0, -q)^{24}$, directly extend (and contain) Jacobi's classical formulas for 2, 4, 6, and 8 squares to 12, 16, 20, and 24 squares, respectively. (Received September 14, 2004)

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