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1003-11-137 **John H. Jaroma*** (jjaroma@austincollege.edu), Austin College, Sherman, TX 75090.
Extending the Lucas-Lehmer Test to a General Class of Number. Preliminary report.

In 1930, D. H. Lehmer provided a necessary and sufficient condition for $M_n = 2^n - 1$ to be prime. This result has become known as the *Lucas-Lehmer test*. It states that M_n is prime $\Leftrightarrow$ it divides the $(n-1)$st term of the sequence, $4, 14, 194, 37634, \ldots$. More specifically, M_n is prime $\Leftrightarrow M_n \mid V_{2^{n-1}}(\sqrt{2}, -1)$, where $V_{2^{n-1}}(\sqrt{2}, -1)$ is the 2^{n-1}st term of the companion Lehmer sequence, $\{V_n(\sqrt{2}, -1)\}$. The necessity of this theorem depends upon M_n having maximal rank of apparition in the corresponding Lehmer sequence, $\{U_n(\sqrt{2}, -1)\}$. In this talk, we provide a classification of all odd primes that have maximal rank of apparition in the Lehmer sequences, followed by an extension of the Lucas-Lehmer test to the general class of number, $2^\alpha p_1^{\alpha_1} p_2^{\alpha_2} \cdots p_k^{\alpha_k} - 1$. (Received August 10, 2004)