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Richard K. Guy* (rkg@cpsc.ucalgary.ca), Calgary, Alberta T2N 1N4, Canada, and **Hugh C. Williams** (hwilliam@ucalgary.ca), Calgary, Alberta T2N 1N4, Canada. *Linear divisibility sequences*. Preliminary report.

This abstract may be read in conjunction with abstract number 1089-11-163. The Lucas-Lehmer theory has given us a good understanding of **divisibility sequences** which satisfy a second order linear recurrence relation. For example, the (unique) **rank of apparition** of a prime p is a divisor of $p - \left(\frac{\Delta}{p}\right)$ where $\left(\frac{\Delta}{p}\right)$ is the Legendre symbol and Δ is the discriminant of the characteristic polynomial. However, we do not know which divisor. Hugh Williams has generalized the theory of Lucas functions to cover fourth order sequences, where, in some cases, primes may have two ranks of apparition, neither of which divides the other. We do not know if we have found all fourth order sequences, nor do we always know, given a fourth order recurrence relation, what sets of initial values, if any, generate fourth order divisibility sequences. Even less is known of higher order divisibility sequences, of which some examples are forthcoming. (Received February 14, 2013)