1014-11-947 **Everett W Howe*** (however@alumni.caltech.edu), Center for Communications Research, San Diego, CA 92121, **Kristin E Lauter** (klauter@microsoft.com), Microsoft Research, One Microsoft Way, Redmond, WA 98052, and **Jaap Top** (top@math.rug.nl), Department of Mathematics, University of Groningen, P.O. Box 800, 9700 AV Groningen, Netherlands. *Pointless curves of genus* 3 *and* 4.

A curve over a field k is *pointless* if it has no k-rational points. We show that there exist pointless genus-3 hyperelliptic curves over a finite field $\mathbb{F}_q$ if and only if $q \leq 25$, that there exist pointless smooth plane quartics over $\mathbb{F}_q$ if and only if either $q \leq 23$ or $q = 29$ or $q = 32$, and that there exist pointless genus-4 curves over $\mathbb{F}_q$ if and only if $q \leq 49$.

We use a variety of techniques to show that pointless curves of a given genus over a given field do not exist. To show that pointless curves *do* exist over a given field, we provide explicit examples. I will explain how we use Galois theory to help us find these explicit examples quickly. (Received September 26, 2005)