1035-11-794 **James Arthur Cipra*** (cipra@math.ksu.edu), 1601 roof drive apt29, manhattan, KS 66502.
Waring's number in a finite field. Preliminary report.

Let p be a prime, n be a positive integer, $q = p^n$ and $\mathbb{F}_q$ be the field of q elements. The smallest s such that $x_1^k + x_2^k + \cdots + x_s^k = \alpha$ has a solution for all $\alpha \in \mathbb{F}_q$ is called Waring's number, denoted $\gamma(k,p)$. I improve a bound on $\gamma(k,p)$ established by Winterhoff to the following: if $\gamma(k,p^n)$ exists then for $p^{\frac{n}{2}} < k < (p^n-1)/2$ we have $\gamma(k,p^n) < \frac{6.2n(2k)^{1/n}\ln(k)}{(\frac{p^n-1}{k},p-1)}$. For the case when $k < p^{\frac{n}{2}}$, an extension of a result by Glibichuk gives $\gamma(k,p) \leq 8$. I also establish lower bounds for special cases in $\mathbb{F}_p$, namely for $t = \frac{p-1}{k}$ prime and $n \leq \phi(t)$, $\gamma(k,p) > (\frac{n!p}{n+1})^{\frac{1}{n}} - n$. (Received September 15, 2007)