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Variations of a conjecture of Ankeny-Artin-Chowla

A famous conjecture of Ankeny, Artin and Chowla relates the class number of a real quadratic field $\mathbb{Q}(\sqrt{p})$ with p a prime congruent to $1 \bmod 4$ with its fundamental unit $\varepsilon = (t + u\sqrt{p})/2$ via a congruence $\bmod\, p$. In particular, the Ankeny-Artin-Chowla (AAC) conjecture states that u is not divisible by p. The significance of their conjecture lies in the fact that it provides an arithmetic way of computing the class number of $\mathbb{Q}(\sqrt{p})$ for p a prime congruent to $1 \bmod 4$. We will discuss the history and techniques of their work as well as show that there are further connections with Fermat quotients and Wieferich style congruences. This is joint work with M. Ram Murty.