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As a consequence, if i denotes an irrational and r, a rational number, their ultimate distribution on the real axis is ...*iririr, ir*.... Hence the number of rationals and irrationals in any finite interval approaches equality as the interval approaches zero and the density of rationals and irrationals on the real axis is the same.

Ever since Weierstrass, there has been a basic confusion, extending even into late twentieth century mathematics, between F: "any finite number, however great" and Z: "an infinite number," as well as the corresponding confusion between f: "a finite number, however small," and z: "an infinitesimal number."

Related to these confusions is the tendency to overlook a basic fact about functions in general; namely that if $\operatorname{Lim}_{x=F} f(x) := L_F f(x)$ and if $\operatorname{Lim}_{x=\infty} f(x) = L_\infty f(x)$ then the Weierstrassian assumption that $L_F = L_\infty$ may not be true. Thus the Heaviside unit function $u(t)$ may be shown to be a square wave of unit altitude and infinite amplitude. Then $L_F u(t) = 1$, but $L_\infty u(t) = 0$; and $L_{-F} u(t) = 0$ but $L_{-\infty} u(t) \neq 1$; et al. (Received October 8, 1992)

*878-11-719 **Jeffrey P. Angel**, University of California at San Diego, La Jolla, CA 92093. *Finite Upper Half Planes.*

We define a finite upper half plane over a finite field F_q, $q = p^r$, p an odd prime, to be $H_q = \{\, x + y\sqrt{\delta} \mid x, y \in F_q,\ y \neq 0 \,\}$ where δ is not a square in F_q. These have been studied by A. Terras, N. Celniker, S. Poulos, C. Trimble, and E. Velasquez apart from myself. I will be considering finite upper half planes over finite fields of characteristic two and over finite commutative rings in general. (Received October 7, 1992)

*878-11-732 **Cynthia E. Trimble**, University of California at San Diego, La Jolla, CA 92093. *"Upper" Half Planes Over Various Fields.*

Over a field, K, (characteristic $\neq 2$) we define an 'upper' half plane to be: $\{x + y\sqrt{\delta} \mid x, y \in K,\ y \neq 0\}$ where δ is a non-square unit in K, with possibly other conditions on y. We discuss explicit connections and analogues when K is:

(1) the real numbers, when we take $y > 0$ and $\delta = -1$, (the Poincaré upper half plane)

(2) a finite degree extension of the p-adic rationals, $\mathbf{Q}_p$, where we take δ a primitive root of unity in K

(3) $\mathbf{F}_q$, a finite field of $q = p^r$ elements ($p \neq 2$), where δ is taken to be some generator of the multiplicative group of $\mathbf{F}_q$

Upper half planes over finite fields of characteristic $\neq 2$ have been found to be highly regular graphs. For $q = p^r$, $q \neq 2$, the upper half plane over F_q is a $(q+1)$-regular graph.

The $(q+1)$-regular tree, which is the universal covering space of the $(q+1)$-regular graphs associated with $\mathbf{F}_q$, can be connected with the upper half plane associated to a degree q extension of $\mathbf{Q}_p$, the p-adic rationals.

Investigation of the connections between the upper half planes over these fields involves both number theory and graph theory. (Received October 6, 1992)

878-11-745 **Steven C. Poulos**, Xavier University of Louisiana, New Orleans, LA 70125. *Finite upper half planes are psuedo-random graphs.*

The finite upper half planes $\mathbf{H}_q(\delta, a)$ where $q = p^r$ with p an odd prime are $q-2$ $q+1$-regular graphs with $q(q-1)$ vertices. These graphs are examples of psuedo-random graphs. This means that the graphs share many of the properties expected of a g raph with same number of vertices and edges with the edges chosen at random. They have been shown to be good expanding graphs by pro ving their eigenvalues satisfy the Ramanujan bound. (Received October 7, 1992)

878-11-758 J. Thompson, 3985 N. Stone #246,Tucson,AZ 85705. A propriety of smarandache function.

In this paper, using some researches, it makes an assumption concerning the following unsolved problem:

Is $\lim_{n\to\infty}\left[1+\sum_{k=2}^{n} \frac{1}{\eta(k)} - \log \eta(n)\right]$ **a constant?,**

where $\eta(n)$ is Smarandache Function: the smallest integer m, such that m! is divisible by n. (Received October 8, 1992)

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