Speaker: Peter Gerdes
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Tuesday, March 25, 2008
2:00 pm
118 Nieuwland Hall

Title: Sets with a non-uniform self-modulus

Abstract:
For $f, g \in \omega^\omega$ denote g pointwise dominates f by $g \succ f$. Following Slaman and Groszek say f is a modulus (of computation) of X if every $g \succ f$ can compute X. Further, f is a self-modulus if $X \equiv_T f$ and f is a uniform modulus if there a single reduction Φ_i so $g \succ f \Leftarrow \Phi_i(g) = X$. Moduli provide a useful tool to explore the relation between computational strength (Turing degree) and a function's rate of growth. We offer several examples of moduli and present some basic results without proof to explore this connection and familiarize the audience with moduli before sketching Groszek and Slaman's argument that if X has a modulus f it must also have a uniform modulus $\bar{f}$. This argument naturally poses the question of whether such a $\bar{f}$ must have a simple definition in terms of f. We answer this question in the negative by showing for any $\alpha < \omega_1^{ck}$ there is a self-modulus f lacking any uniform modulus computate in $f^{(\alpha)}$. The construction of such an f is detailed for the case $\alpha = \omega$.

While unnecessary for the main result the omitted proofs of several properties of self-moduli are quite interesting in and of themselves and I will be presenting them in the recursion theory seminar following this talk.