Exam 3.

The solutions are due Wednesday Dec 12. Either leave them under my office door (456 Little Hall) or with the receptionist at 358 Little Hall, or send them by e-mail to my address (preferably in pdf).

1. A *hypergraph* of arity n on a set X is just any subset of $[X]^n$. Its elements are called hyperedges.

Let $X = 3^\omega$ with the usual topology. Let G be the hypergraph of arity 3 on X, consisting of all triples $\{x_0, x_1, x_2\}$ such that for some $n \in \omega$, $x_0(m) = x_1(m) = x_2(m)$ whenever $m \neq n$, and $x_0(n) = 0$, $x_1(n) = 1$ and $x_2(n) = 2$. Show that every Borel nonmeager set $B \subset X$ contains a G-hyperedge.

2. Let $B \subset 2^\omega$ be a set and consider the game $G(B)$ in which Players I and II alternate playing nonempty finite binary strings t_n for $n \in \omega$. Player II wins if the concatenation $x \in 2^\omega$ of these strings belongs to B. Show that Player II has a winning strategy in $G(B)$ if and only if the set B is comeager.