Homework 3, Morally Due Tue Feb 19, 2013
COURSE WEBSITE: http://www.cs.umd.edu/˜gasarch/858/S13.html
(The symbol before gasarch is a tilde.)

1. (0 points) What is your name? Write it clearly. Staple your HW. When is the midterm (give Date and Time)? If you cannot make it in that day/time see me ASAP. Join the Piazza group for the course. The codename is cmsc858. Look at the link on the class webpage about projects. Come see me about a project. READ the note on the class webpage that say THIS YOU SHOULD READ that you haven't already read.

2. (50 points) Let $(X, \preceq)$ be a set with an order on it. Let $\preceq_{\rm awesme}$ be the following order on X^*

$$x_1 x_2 \cdots x_n \preceq_{\rm awesme} y_1 y_2 \cdots y_m$$

   if there exists $i_1 < i_2 < \ldots < i_n$ (numeric order) such that

   $x_1 \preceq y_{i_1}$

   $x_2 \preceq y_{i_2}$

   $\vdots$

   $x_n \preceq y_{i_n}$.

   Show that if $(X, \preceq)$ is a wqo then $(X^*, \preceq_{\rm awesme})$ is a wqo. (HINT: This is similar to the proof that Σ^* under subsequence is a wqo.)

3. (50 points) Find a function $f(k)$ such that the following two statements are true:

   (a) For all colorings of $[f(k)]$ either there are k numbers colored the same or there are k numbers colored differently.

   (b) There is a coloring of $[f(k)-1]$ such that there are NO k numbers colored the same, NOR are there k numbers colored differently.

4. (Extra Credit- hand in to bill on sep sheet.) Let $(X, \preceq)$ be a wqo. Let $\binom{X}{<\omega}$ be the set of all FINITE subsets of X. We order $\binom{X}{<\omega}$ by, if $A, B \in \binom{X}{<\omega}$, then $A \preceq' B$ if there is a 1-1 map f from A to B where, for all $x \in A$, $x \preceq f(x)$. Show that $(\binom{X}{<\omega}, \preceq')$ is a wqo.