HW 1.

1. (Bender-Stone, Green) We have explained why the Russell class $\mathcal{R} = \{x \mid x \notin x\}$ is a proper class. Show that each one of the following is also a proper class.
   (a) The class $\mathcal{C}$ of all sets.
   (b) The class $\mathcal{D}$ of all 1-element sets.
   (You should express both $\mathcal{C}$ and $\mathcal{D}$ as classes, and then that they are proper.)

2. (Bender-Stone, Rodriguez) Let T be the theory axiomatized by all the axioms of ZFC except the Axiom of Foundation. ($T = \text{ZFC} \setminus \{\text{Fnd}\}$.) From T, prove that the Axiom of Foundation is equivalent to the following statement:
   There is no function f with domain ω such that $f(n+1) \in f(n)$ for all n.

3. (Green, Rodriguez) Prove that $m^{n+k} = m^n \cdot m^k$. (You may assume all the laws of successor and addition that we proved.)