

## 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  $\omega$  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.)