

# Combinatorics Homework

Homework Due on May 07, 2015 but will not be collected

Do the following problems and, of course, give explanation when needed.

1. A grade school class has three sports teams. For any two students in the class, there is at least one team so that the two students are members of that team. Prove there is a team that contains at least  $2/3$  of the students of the class.
2. (a) Prove combinatorially that  $D(n+1) = n(D(n) + D(n-1))$  if  $n \geq 1$ . Set  $D(0) = 1$  and  $D(1) = 0$ .  
(b) Use this recursion to get the exponential generating function for  $D(n)$  is:  $\frac{e^{-x}}{1-x}$ .