21-301 Combinatorics
Homework 6
Due: Wednesday, October 27

1. Let $r_n = r(3, 3, \ldots, 3)$ be the minimum integer such that if we n-color the edges of the complete graph K_N there is a monochromatic triangle.

   (a) Show that $r_n \le n(r_{n-1} - 1) + 2$.

   (b) Using $r_2 = 6$, show that $r_n \le \lfloor n!e \rfloor + 1$.

2. Show that $r(C_4, C_4) = 6$, where C_4 denotes a cycle of length 4.

3. Use Dilworth's theorem to show that if in a bipartite graph $G = (A, B, E)$ we have that $|N(S)| \ge |S| - t$ for all $S \subseteq A$, then there is a matching of size at least $|A| - t$.