Math 301: Homework 9

Due Wednesday November 15 at noon on Canvas

1. Show that in any 2-coloring of the edge set of K_n, there are $\Omega(n^s)$ copies of K_s.
2. In Schur's theorem, we showed that for any 2-coloring of $\{1, \cdots, n\}$ for n large enough there contains a monochromatic solution to $x + y = z$. We did not require that x, y, z are distinct. Use Problem 1 to show that we can find x, y, z with the additional requirement that none of them are the same.
3. Find an example of a group G and $O(|G|^{1/2})$ Sidon sets in G such that every element of G is in at least one of the Sidon sets.
4. Show that there is a 2-coloring of the natural numbers that contains no infinite arithmetic progression.