

1. Let $n \geq 2$ and A be a set containing $n + 1$ different positive integers. Assume that each element of A is smaller than $2n$. Show that there are three numbers a, b and c in A such that $a = b + c$. Hint: Construct $2n$ positive numbers each of which is smaller than $2n$.
2. In a class of 10 students, every student has at least 7 friends. Show that every three students have a common friend.
3. A student took a combinatorics class that lasted for 20 weeks. He solved at least one problem every day but he never solved more than 13 problems a week. Show that there are a few consecutive days such that the student solved exactly 19 problems during these days. Hint: Let s_i be the number of problems solved during the first i days.