www.artofproblemsolving.com/community/c345604

by randomusername

1 Let $1 \leq k \leq n$ be integers. At most how many k-element subsets can we select from $\{1, 2, \ldots, n\}$ such that for any two selected subsets, one of the subsets consists of the k smallest elements of their union?

---

2 Prove that for any finite set A of positive integers, there exists a subset B of A satisfying the following conditions:
-if $b_1, b_2 \in B$ are distinct, then neither b_1 and b_2 nor $b_1 + 1$ and $b_2 + 1$ are multiples of each other, and
- for any $a \in A$, we can find a $b \in B$ such that a divides b or $b + 1$ divides $a + 1$.

---

3 If $p, q \in \mathbb{R}[x]$ satisfy $p(p(x)) = q(x)^2$, does it follow that $p(x) = r(x)^2$ for some $r \in \mathbb{R}[x]$?
