1. Let $x_1, \ldots, x_n$ be vectors in Euclidean space with $\|x_i\| \geq 1$ for each $i$. Show that there are at most $\left\lfloor \frac{n^2}{4} \right\rfloor$ pairs $x_i, x_j$ such that $\|x_i + x_j\| < 1$.

2. For every $r \geq 3$ find $G$ which does not contain $K_r$, is not $(r - 1)$-partite and has $r + 2$ vertices.

3. Prove that any red-blue coloring of $K_{3n - 1}$ contains a monochromatic matching of size $n$. On the other hand, find a red-blue coloring of $K_{3n - 2}$ with no such matching.