1. Prove that in any simple graph $G$ with $n$ vertices and $m$ edges, $2m \leq n^2 - n$.

2. Show that in any simple graph $G$ there is a path from any vertex of odd degree to another vertex of odd degree.

3. Let $G$ be a graph with $n \geq 2$ vertices. Prove that if $\delta(G) \geq \frac{n}{2}$, then $G$ is connected.