3. Prove that $\sqrt{8}$ is not rational.

4. Suppose that $n \geq 2$ players take part in a scrabble competition. Suppose the $i$th player plays games with $d_i$ other players at the competition. Show that at least two players must play with the same number of other players, that is there are values $j$ and $k$ with $1 \leq j, k \leq n$ such that $d_j = d_k$. 