1. Let $G$ be a connected graph such that for any edge $e$ of $G$ there are two cycles which intersect only in that edge. Prove that $G$ is 3-edge-connected. Use this to show the Petersen graph is 3-edge-connected.

2. Given $0 < k \leq \ell \leq m$ construct a graph $G$ with $\kappa(G) = k$, $\lambda(G) = \ell$ and $\delta(G) = m$ (i.e., vertex-connectivity $k$, edge-connectivity $\ell$ and minimum degree $m$).

3. Recall that a directed graph is strongly connected if there is a directed path between any two vertices. Show that an undirected graph $G$ is 2-edge-connected if and only if there is a way to orient $G$ to form the directed graph $\vec{G}$ (i.e., where each edge is assigned one of the two possible orientations) so that $\vec{G}$ is strongly connected.

4. Given that $G$ is $k$-connected show that any $k$ vertices lie on some cycle in the graph.