1. Show that an element has order 2 in S_n if and only if its cycle docomposition is a product of commuting 2-cycles.

2. A pointed set is a pair (S, x) where S is a set and $x \in S$. A morphism of pointed sets is a function $f : (S, x) \to (S', x')$ such that $f(x) = x'$. Show that pointed sets form a category.

3. Prove that if G is a group and $\{H_i : i \in I\}$ is a nonempty collection of subgroups of G, then $\bigcap_{i \in I} H_i$ is a subgroup of G.