1. Prove that, up to isomorphism, there are only two different groups of order 4.

2. Prove that the set of all even permutations of the set \{1, 2, \ldots, n\} forms a subgroup of \(S(n)\). This subgroup is called the \textit{alternating group on n symbols} and is denoted by \(A(n)\).

3. Find the order of \(A(n)\).

4. List all elements of \(A(4)\) and determine their orders.

5. Find all subgroups of \(A(4)\). Deduce that the converse of Lagrange’s Theorem is not true: there is a divisor \(d\) of the order of \(A(4)\) for which \(A(4)\) has no subgroup with \(d\) elements.