Rohan Jain

Question: 5

List the subgroups of S_4. Find each of the following sets:

a. $\{\sigma \in S_4 : \sigma(1) = 3\}$

b. $\{\sigma \in S_4 : \sigma(2) = 2\}$

c. $\{\sigma \in S_4 : \sigma(1) = 3 \text{ and } \sigma(2) = 2\}$

Solution:

Question: 6

Find all of the subgroups in A_4. What is the order of each subgroup?

Solution:

Question: 7

Find all possible orders of elements in S_7 and A_7.

Solution:

Question: 23

If σ is a cycle of odd length, prove that σ^2 is also a cycle.

Solution: Let's say that σ has length k and that it can be written in cycle notation as $(a_1, a_2, \ldots, a_k)$. Then σ^2 is the permutation $(a_1, a_3, \ldots, a_k, a_2, a_4, \ldots a_{k-1})$. The term a_{k-1} would be sent to a_1 which would complete the cycle if k is odd.

Question: 25

Prove that in A_n for $n \geqslant 3$, any permutation is a product of cycles of length 3.

Solution:

Question: 29

Recall that the the ***center*** of a group G is

$$Z(G) = \{g \in G : gx = xg \text{ for all } x \in G\}.$$

Find the center of D_8. What about the center of D_{10}? What is the center of D_n?

Solution: