

Worksheet 12

Math 392, Abstract Algebra

Wednesday, February 10, 2021

Let G be the group of rotations of a cube. Last time we saw that the order of G is 24, meaning that G has 24 elements.

1. G has some elements of order 4, meaning elements $g \in G$ such that g , g^2 , and g^3 are different from the identity, but g^4 is the identity. How many such elements are there? Do your colleagues agree?
2. How many elements of order 3 are there in G ?
3. How many elements of order 2?
4. How many elements of order 1?
5. Are there any others? Do your answers add up to 24?
6. If you have time to spare, answer the same questions for the group of rotations of a *regular tetrahedron*, which is a solid with four triangular faces, also known as a triangular-based pyramid. What is the order of the group? How many elements does it have of order 1, 2, 3, etc.?