Question: 5

Let $G = A_4$ and suppose that G acts on itself by conjugation; that is, $(g, h) \mapsto ghg^{-1}$.

a. Determine the conjugacy classes (orbits) of each element of G.

b. Determine all of the isotropy subgroups for each element of G.

Solution: To start, it will help to write out all the elements of A_4.

$$A_4 = \{e, (1\ 2)(3\ 4), (1\ 2\ 3), (1\ 2\ 4), (1\ 3\ 2), (1\ 3\ 4), (1\ 3)(2\ 4), (1\ 4\ 2), (1\ 4\ 3), (1\ 4)(2\ 3), (2\ 3\ 4), (2\ 4\ 3)\}$$

a.

Question: 6

Find the conjugacy classes and the class equation for each of the following groups.

a. S_4

b. D_4

c. $\mathbb{Z}_9$

d. Q_8

Solution:

Question: 10

Find the number of ways a six-sided die can be constructed if each side is marked differently with $1, \ldots, 6$ dots.

Solution:

Question: 12

Consider 12 straight wires of equal lengths with their ends soldered together to form the edges of a cube. Either silver or copper wire can be used for each edge. How many different ways can the cube be constructed?

Solution:

Question: 13

Suppose that we color each of the eight corners of a cube. Using three different colors, how many ways can the corners be colored up to a rotation of the cube?

Solution: