Math 311 Solution
Quiz 4 3 October 2002

1. The symbol S_n denotes the symmetric group of degree n. What are the elements of S_n, and how do we combine them?

   Solution: The elements of S_n are the permutations of the set $\{1, 2, \ldots n\}$. (A permutation of a set A is a map from A to A that is one-to-one and onto.) The group operation in S_n is function composition.

2. Let $\alpha = (1\ 4\ 2)(3\ 6)$ and $\beta = (5\ 4\ 6\ 1)$ be elements of S_6. Write $\alpha\beta$ and $\beta\alpha$ as products of disjoint cycles.

   Solution: We have

$$\begin{aligned} \alpha\beta &= (1\ 4\ 2)(3\ 6)(5\ 4\ 6\ 1) \\ &= (1\ 5\ 2)(3\ 6\ 4) \end{aligned}$$

   and

$$\begin{aligned} \beta\alpha &= (5\ 4\ 6\ 1)(1\ 4\ 2)(3\ 6) \\ &= (1\ 6\ 3)(2\ 5\ 4) \end{aligned}$$