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0.1 Permutations and the symmetric group

A permutation is defined as a bijection from a set to itself.

For a set of size n, the number of permutations is $n!$. This is because there are n possibilities for the first item, $n-1$ for the second and so on.

0.1.1 The symmetric group

The set of all permutations forms a group, the symmetric group. This forms a group because:

- There is an identity element
- Each combination of permutations is also in the group.
- Each permutation has an inverse in the group.

0.1.2 Permutation groups

A subgroup of the symmetric group is called a permutation group.