Lemma: If $\epsilon = \beta_1\beta_2 \cdots \beta_r$ where the β_i's are 2-cycles, then r is even. That is, the identity can not be written as the product of an *odd* number of 2-cycles.

Theorem 5.5: If a permutation α can be expressed as the product of an even number of transpositions, then every decomposition of α must have an even number of transpositions. If the number of transpositions is odd in one decomposition, then every decomposition of α consists of an odd number of transpositions.

October 6, 2004