PMATH 347 Groups and Rings, Exercises for Chapter 3

1: In S_8, let $\alpha = (1632)(27)(3748)$ and let $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 5 & 7 & 2 & 8 & 4 & 1 & 6 \end{pmatrix}$.

(a) Find $|\alpha|$ and find $(-1)^{\beta}$.

(b) Express each of the permutations α^{110} and $\alpha\beta\alpha^{-1}$ as products of disjoint cycles.

2: (a) Find the number of elements of each order in S_7 and in A_7.

(b) Find the number of cyclic subgroups of A_7.

3: Let $n \geq 3$.

(a) Show that $Z(S_n) = \{e\}$.

(b) Show that every element in A_n is equal to a product of 3-cycles.