HOMEWORK 2 - MATH402B

DUE: WEDNESDAY OCTOBER 11TH

(1) Let $f, g, h : X \to X$ be three function on the set X such that $f \circ g = h$, $g \circ h = f$ and $h \circ f = g$. Show that if f is surjective then both g and h are surjective.

(2) Goodman 1.5.2

(3) Goodman 1.5.3

(4) Goodman 1.5.5

(5) Goodman 1.5.7

(6) Goodman 1.5.10

(7) Find all numbers n such that S_8 has an element of order n.

(8) Give a formula for the number of m-cycles in S_n for each $m \leq n$.

(9) 1.6.8

(10) Let X be a set and let Δ be the symmetric difference, i.e. Δ is the binary operation on the power set $\mathcal{P}(X)$ (i.e. the set of all subsets of X) such that for any $A, B \in \mathcal{P}(X)$

$$A \Delta B = (A \setminus B) \cup (B \setminus A)$$

Prove that $(\mathcal{P}(X), \Delta)$ is an abelian group and compute the orders of all elements.