## MATH 3360 HOMEWORK ASSIGNMENT 10

DUE ON TUESDAY 7 APRIL 2020

- (1) Let P be the set of partitons of  $X = \{1, 2, 3, 4\}$ ; the usual action of  $S_4$  on X also defines an action of  $S_4$  on P. (You should verify this claim but do not need to include it in your answer.)
  - (a) List the elements of P.
  - (b) Find the orbits in X of the  $S_4$ -action.
  - (c) Find the orbits in P of the  $S_4$ -action.
- (2) Let p be a prime and G a group of order  $p^3$  that is not abelian.
  - (a) Show that |Z(G)| = p holds.
  - (b) Determine G/Z(G) up to isomorphism.
- (3) Let G be a finite group acting on itself by conjugation. Show that if x and y are conjugates in G, then  $|C_G(x)| = |C_G(y)|$  holds.