Assignment - 2

1. Determine the conjugacy classes in A_4. Compute $Z(A_n)$, $n \geq 4$. (1)

2. Prove that the 3-cycles in A_5 form a single conjugacy class. Find two 5-cycles in A_5 that are <u>not</u> conjugate in A_5. (1)

3. Using the description of D_n (dihedral group of order $2n$) in terms of a rotation r of order n & a reflection s of order 2, Compute $Z(D_n)$, distinguishing the cases when n is odd & when n is even. (1)

4. Let $m \geq 2$. Verify that the $4m$-element set $D = \{e, x, \ldots, x^{2m-1}, y, xy, \ldots, x^{2m-1}y\}$ with products given by : $xe = x = ex$, $ey = y = ye$,

$$x^i x^j = x^{i+j}, \quad x^i(x^j y) = x^{i+j} y, \quad (x^i y) x^j = x^{i-j} y,$$

$$(x^i y)(x^j y) = x^{i-j+m} \; ; \quad 0 \leq i, j \leq 2m-1,$$

is a group, where powers of x are read mod $2m$. D is called the dicyclic group of order $4m$. D is the quaternion group when $m = 2$. (1)