HOMEWORK 5

Prove the following.

(1) Research or ask about the Quaternion group of order 8. Show explicitly that it is not isomorphic to D_4 (hint, count the number of elements of order 2 in both groups).
(2) Explicitly express D_4 as a subgroup of S_4 by following what D_4 does to the vertices of a square.
(3) Look up what the center of a group is in your textbook. Show that D_n has a non-trivial center if and only if n is even. (Hint: it may be helpful to first prove that $2x = 0 \mod n$ has a solution if and only if n is even.)
(4) Write a subgroup of $GL(2, \mathbb{R})$ which is isomorphic to D_4 (hint: write the matrix which corresponds to the linear maps of $\mathbb{R}^2$ preserving the square).