MS321 Algebra, tutorial 6

1. List the left cosets of $\langle(2,2)\rangle$ in $\mathbf{Z}_6 \times \mathbf{Z}_{10}$.

2. For $H < G$ show that $gH = Hg$ for every $g \in G$ if and only if $ghg^{-1} \in H$ for every $g \in G$ and for every $h \in H$.

3. Use Lagrange's Theorem to find all the subgroups of D_4, the symmetry group of the square. Hint: There are 10.

4. Use Lagrange's Theorem to prove that if p is a prime number and n is any integer then $n^p - n$ is a multiple of p. Hint: Look at cases $p \mid n$ and $p \nmid n$ using Q4 from Tutorial 4 for second case.