Q5: Let $H \leq G$,$|G| = p^{\alpha}m$ and $|H| = p^{\beta}n$. By Sylow's Theorem, there is a $Q \leq H$,which is a Sylow p subgroup of H. By Sylow's Theorem, there exists a p subgroup P of G, and there exists some $g \in G$ such that $Q \leq gPg^{-1}$. Since $Q \subset gPg^{-1} \cap H$, we have that $|gPg^{-1} \cap H| \geq |Q| = p^{\beta}$. But by lagranges theorem we also have that $p^{b}eta \big| |gPg^{-1} \cap H|$, so $p^{\beta} \leq |gPg^{-1} \cap H|$. This proves the result.