

1. There are only two possible ways to have a subgroup of order 4. Explain.

2. Let G be a group and $x, y \in G$ such that $|x| = 8$ and $|y| = 2$. The elements satisfy the relation $xy = yx^3$.
 - (a) Show that $x^2y = yx^6$.

 - (b) Show that $x^3y = yx$.

 - (c) Continue on with the others.

 - (d) Use the relations to find the cyclic subgroups generated by each of the following elements: $xy, x^2y, x^3y, x^4y, x^5y, x^6y, x^7y$.

3. Show that $x^4 \in Z(G)$ (the center of G).