1. Let $\alpha = (1,7,6)(2,5)(3,4,8,9) \in S_9$ (permutation in cycle notation)
   (a) What is the order of α? Explain.
   (b) What is the parity of α? Explain.
   (c) Express α^{2027} as a product of disjoint cycles. Explain.
2. In each case, exhibit, with proof, a concrete example of a nontrivial proper subgroup H of the symmetric group S_3 such that
   (a) H is normal in S_3 (b) H is not normal in S_3
3. Use the Chinese remainder formula to find all solutions to the system of congruences:
$$x \equiv 2 \bmod 5 \qquad x \equiv 2 \bmod 7 \qquad x \equiv 5 \bmod 8$$
4. (a) How many group homomorphisms $\varphi\colon \mathbf{Z} \to \mathbf{Z}_{54}$ are there?
   (b) How many of these φ are injective and how many are surjective?
   (c) Prove your assertions.