Question 1. Suppose G is a group.

1. Suppose N is a normal subgroup of G and G is finitely generated. Then the quotient group G/N is also finitely generated.
2. If N is normal in G with both N and G/N finitely generated. Then G is finitely generated.
3. If $H \leq G$ a subgroup of a group G, with H finite index, then H finitely generated if and only if G is. The only if is easier to prove using geometry!

Question 2. Suppose G is a finitely generated group. Show that for any two finite (may as well assume symmetric) generating sets S, T, that $C(G, S)$ is QI to $C(G, T)$.

Question 3. Show that the composition of two QI's is a QI and that QI is an equivalence relation on metric spaces.

Question 4. Verify what I said about T_3 and T_4 being QI and show that T_m is QI to T_n for any $m \neq n$ both greater than or equal to 3.

Question 5. Suppose $\phi : \Gamma_1 \to \Gamma_2$ is a homomorphism between finitely generated groups. Show that if ϕ is a quasi-isometric embedding then $\ker(\phi)$ is finite and that ϕ is a quasi-isometry if and only if $\ker(\phi)$ and $\Gamma_2/im(\phi)$ are both finite.

Question 6. Think about why F_2 and $\mathbb{Z}_2$ cannot be quasi-isometric. I am not asking you to write a proof of this - you need some machinery to write a real proof - but can you "explain" why they shouldn't be?