1. Find all the topologies on the set \( X = \{0, 1\} \). Which ones are Hausdorff?

2. Verify that the co-finite topology is in fact a topology. When is it metrizable?

3. Show that if \( X \) is finite and \( T \) is a metrizable topology on \( X \) then \( T \) is the discrete topology.