

0. Print your name: \_\_\_\_\_

1. Let  $X = \{a, b\}$ . Define a relation  $R$  on the power set of  $X$  by  $\alpha R \beta$  to mean that  $\alpha$  is a proper subset of  $\beta$ . Draw the directed graph of  $R$ .

2. Let  $X$  be a set. Define a relation  $R$  on the power set of  $X$  by  $\alpha R \beta$  to mean  $\alpha$  has the same cardinality as  $\beta$ . Prove that  $R$  is an equivalence relation.

3. Suppose  $X$  is a set with  $n$  elements. How many relations are there on  $X$  which are both reflexive and symmetric? Explain your answer.