1. a)   Let $A = \{5, 6, 7, 8, 9\}$ and $R_a = \{(5,5), (5,9), (6,6), (6,7) ,(7,6), (7,7), (8,8), (9,5), (9,9)\}$.
What partition P_a corresponds to the relation R_a on P_a?

   b)   Let A be as above, and let $P_b = \{\{5\}, \{6,7,8\}, \{9\}\}$. What relation corresponds to the partition P_b?

2. a)   Give an example of a relation on the set $\{1,2,3,4,5\}$ that is reflexive, symmetric, and transitive.

   b)   Give an example of a relation on the set $\{1,2,3,4,5\}$ that is reflexive, not symmetric and not transitive.

3. Consider the relation $\triangleleft$ on $\mathbb{R}$ defined by $x \triangleleft y \Leftrightarrow x \leq 2y$. Determine whether $\triangleleft$ is reflexive, symmetric, or transitive, and justify your conclusions clearly.

4. Let $\mathcal{F}$ be a partition of a set A. Define a relation R on A by

$$(a,b) \in R \Leftrightarrow (\exists X \in \mathcal{F}) [a, b \in X]$$

Show that R is an equivalence relation on A.

5. a) Regarding the function $f : A \to B$ as a subset of $A \times B$, write the definition of f^{-1}.

    b) Let A be some set. Write the identity function $i{:}A \to A$ as a relation on $A \times A$.