1. a) State the definition of a transitive relation.

   b) Give an example of a relation on the set $\{1, 2, 3\}$ which is reflexive but not symmetric.

2. a) Suppose that ~ is the relation on the set $A = \{a, b, c, d, e\}$ given by $\{(a, a), (a, c), (a, e),$ $(b, b), (c, a), (c, c), (c, e), (d, d), (e, a), (e, c), (e, e)\}$. Write the partition $\mathcal{P}$ corresponding to ~.

   b) Suppose that $\mathcal{P}$ is the partition $\{\{1\}, \{2, 4\}, \{3, 5\}\}$ of the set $A = \{1, 2, 3, 4, 5\}$. Write the equivalence class of 2 under the corresponding relation.

3. Let ~ be a relation on $\mathbb{Z}$ defined by $a \sim b$ iff $a = 3b$. Determine whether ~ is reflexive, symmetric, or transitive.

4. a) Express the definition of the sum of two functions in terms of ordered pairs.

   b) Express the definition of the composition of two functions in terms of ordered pairs.

5. Every cubic graph has an even number of vertices.