1. Consider the sets $A = \{2, 3, 5\}$ and $B = \{3, 8\}$, and the relation $(x, y) \in R \iff x^2+y^2$ is odd. Compute the inverse relation R^{-1}, as well as the matrix representation for R^{-1}.

2. Consider the sets $A = \{a_1, a_2, a_3\}$, $B = \{b_1, b_2\}$, and $C = \{c_1, c_2, c_3\}$, with the following relations from R from A to B, and S from B to C :

$$R = \{(a_1, b_2), (a_2, b_1), (a_3, b_1)\},$$
$$S = \{(b_1, c_2), (b_1, c_3), (b_2, c_1)\}.$$

What is the matrix of $R \circ S$?

3. The relation $\leq$ on $\mathbb{Z}$ is (circle all that apply):

   (a) reflexive,
   (b) symmetric,
   (c) antisymmetric,
   (d) transitive,
   (e) a partial order,
   (f) an equivalence relation.

4. Consider the relation R on $\mathbb{N}$ given by $m \sim n$ when m and n have *exactly* the same digits, but perhaps in a different order. Thus, $1233 \sim 3213$, but $1233 \not\sim 321$. The relation $\sim$ on $\mathbb{N}$ is (circle all that apply):

    (a) reflexive,

    (b) symmetric,

    (c) antisymmetric,

    (d) transitive,

    (e) a partial order,

    (f) an equivalence relation.

5. Let A be the set of all subsets of $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Is the subset relation $\subseteq$ on A a partial order? Justify your answer.

6. Let $\models$ be a relation on $\mathbb{N}$ such that $m \models n$ if m and n both begin with the same digit. Thus, $123 \models 1973$, but *not* $123 \models 213$. Is the relation $\models$ on $\mathbb{N}$ an equivalence relation? Justify your answer.