NIRMA UNIVERSITY
Institute Of Technology, Ahmedabad
B.Tech. 3rd CE/IT (ODD 2020-21)
2CS305: Discrete Mathematics
Tutorial -2
Topic-Relations

1. Give an example of a relation on a set that is
   a) both symmetric and antisymmetric.
   b) neither symmetric nor antisymmetric

2. Determine whether the relation R on the set of all people is reflexive,
   symmetric, antisymmetric, and/or transitive,
   where (a, b) ∈ R if and only if
   a) a is taller than b.
   b) a and b were born on the same day.
   c) a has the same first name as b.
   d) a and b have a common grandparent.

.

3. Which of these are posets?
   a) (R, =) b) (R,<) c) (R,≤) d) ((Z,≥))

4. Answer these questions for the poset ({{1}, {2}, {4},
   {1, 2}, {1, 4}, {2, 4}, {3, 4}, {1, 3, 4}, {2, 3, 4}}, ⊆).
   a) Find the maximal elements.
   b) Find the minimal elements.
   c) Is there a greatest element?
   d) Is there a least element?
   e) Find all upper bounds of {{2}, {4}}.
   f) Find the least upper bound of {{2}, {4}}, if it exists.
   g) Find all lower bounds of {{1, 3, 4}, {2, 3, 4}}.
   h) Find the greatest lower bound of {{1, 3, 4}, {2, 3, 4}}, if it exists.

5. Let R be an reflexive relation on a set A. Show that R is an equivalence relation if and only if (a,b) and (a,c) are in R implies that (b,c) is in R.

6. Let Dm denote the positive divisors of m ordered by divisibility. Draw the Hasse diagrams of:
   (a) D12; (b) D15; (c) D16; (d) D17.

7. Let A={2,3,6,12,24,36}and the relation $\leq$ be such that a $\leq$ b if a divides b. Draw Hasse diagram of (A, $\leq$).