Assignment 1
Sets and Relations
Submission Date: 24 August 2019

Answer all the questions

1. Let $A = \{1, 2\}$, construct $\mathscr{P}(A) \times A$ where $\mathscr{P}(A)$ is the power set of A.

2. Let A be a set of Books. Let $\mathcal{R}$ be a relation on A such that book a is related book b if and only if book a costs more and contains fewer pages than the book b. Check whether the relation $\mathcal{R}$ is reflexive, symmetric, antisymmetric or transitive? Does this relation form a poset or equivalence class?

3. Let $\mathcal{R}$ be a binary relation on the set of strings of 0s and 1s such that

$$\mathcal{R} = \{(a, b) : a \text{ and } b \text{ are strings that have same number of 0s}\}$$

   Is R an equivalence relation? or a partial ordering relation?

4. In a college, there are three student clubs. Sixty students are only in the Drama club, 80 students are only in the Dance club, 30 students are only in the Maths club, 40 students are in both Drama and Dance clubs, 12 students are in both Dance and Maths clubs, 7 students are in both Drama and Maths clubs, and 2 students are in all the clubs. If 75% of the students in the college are not in any of these clubs, then what is the total number of students in the college? **[GATE-CS-2019]**

5. Let $S = \{v_1, v_2, \ldots, v_n\}$ be set of all variables used in a program. Define a relation $\mathcal{R}$, on S such that two variables are related if their values are same. (for example, if $a = 5$ and $b = 5$, we say a is related to b). Prove that, during the course of running the program, $\mathcal{R}$ is an equivalence relation.