INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

Monsoon Semester (Aug-Nov), 2019
Discrete Structures (DS)

Tutorial VII
September 12, 2019

Due: 16.09.19

Instructor: Dr. P. Kumar

INSTRUCTIONS:

Problems to be discussed in Tutorial in the week of Monday 16th Sep 2019.

1. **(Set Operations)** Given $A = \{x \mid x \text{is an integer and } 1 \leq x \leq 5\}, B = \{3, 4, 5, 17\}$, and $C = \{1, 2, 3, \dots\}$, find
   1. $A \cap B$
   2. $A \cup B$
   3. $A \cap C$
   4. $A \cup C$
2. 1. Show that $A \subseteq A \cup B$ and $A \cap B \subseteq A$
   2. Show that $A \subseteq B \iff A \cup B = B$
3. Given $A = \{2, 3, 4\}, B = \{1, 2\}, C = \{4, 5, 6\}$, find
   1. $A + B$
   2. $B + C$
   3. $A + B + C$
   4. $(A + B) + (B + C)$

   where $+$ is the symmetric difference.
4. Give examples of sets A, B, C such that $A \cup B = A \cup C$, but $B \neq C$.
5. Write sets
   1. $\phi \cap \{\phi\}$
   2. $\{\phi\} \cap \{\phi\}$
   3. $\{\phi, \{\phi\}\} - \phi$
6. 1. Write members of $\{a, b\} \times \{1, 2, 3\}$
   2. Write members of $A \times B \times C, B^2, A^3, B^2 \times A, A \times B$, where $A = \{1\}, B = \{a, b\}, C = \{2, x\}$
   3. Show by means of examples that $A \times B \neq B \times A$ and $(A \times B) \times C \neq A \times (B \times A)$
7. Show that for any two sets A and B

$$\rho(A) \cup \rho(B) \subseteq \rho(A \cup B)$$
$$\rho(A) \cap \rho(B) = \rho(A \cap B)$$

Student's name:

End of Tutorial