

Tutorial No 1: Basics of Set Theory & PMI, Strong PMI

1. Suppose A and B are sets. Give venn diagram to represent $(A-B) \cup (B-A) \cup (A \cap B)$ and using same, find simple expression.
2. Give truth table and find simple statement for $P \vee \neg(P \rightarrow Q)$
3. What is the relationship between $2^{A \cup B}$ and $2^A \cup 2^B$.
4. Show that for any language L, $L^* = (L^*)^* = (L^+)^* = (L^+)^+$
5. Find relation between $L_1(L_2 \cap L_3)$ and $L_1L_2 \cap L_1L_3$
6. **Prove that for every $n \geq 0$,**
$$\sum_{i=1}^n i^2 = n(n+1)(2n+1)/6$$
7. **Prove that for any string x, $|x^r| = |x|$**
8. Give recursive definitions of each of the following sets.
 - a. The set N of all natural numbers.
 - b. The set S of all integers divisible by 7.
 - c. The set U of all strings in $\{0,1\}^*$ containing the substring 00.