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^{AUB} and 2^A U 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 ≥ 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.