

Computer Science & Engineering Department
I. I. T. Kharagpur

Foundations of Computing : CS 300053
3rd Year ID Elective : 5th Semester
Tutorial - I

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1. Prove that $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$.
2. Write *converse* or *contrapositive* of the following statement.
if x and y are odd then $x - y$ is even.
3. Give a clean proof of the following statement.
 $A = \{m \in \mathbb{Z} : m = 3n + 4, n \in \mathbb{Z}\}$ is *closed under multiplication* (\times).
4. Give a clean proof of the following statement.
 n is an odd integer iff x^2 is odd.
5. Let $f : A \rightarrow B$ be an *onto* map, $|A| = m$ and $|B| = n$. The number of elements of A mapped to the i^{th} element of B be m_i i.e. $\sum_{i=1}^n m_i = m$.
Count the number of right-inverses of f .
6. A *relation* R on a A ($R \subseteq A \times A$) is called *symmetric*, if $(a, b) \in R \Rightarrow (b, a) \in R$, for all $a, b \in A$. Let $|A| = n$.
Count the total number of symmetric relations on A .
7. Prove the following statement.
If A and B are denumerable sets, then so is $A \cup B$.
8. Disprove the following statement.
If A and B are denumerable sets, then so is $A \cap B$.
9. Show that two closed intervals on a real line are *equinumerous* i.e. $[a, b] \simeq [c, d]$.
10. Explain *diagonalization* in the proof of $\mathbb{N} \not\approx \mathcal{P}\mathbb{N}$.