

DISCRETE MATHEMATICS

ASSIGNMENT 1 – UNIT 1

- In a survey of 120 people, it was found that: 65 read Newsweek magazine, 20 read both Newsweek and Time, 45 read Time, 25 read both Newsweek and Fortune, 42 read Fortune, 15 read both Time and Fortune, 8 read all three magazines.
 - Find the number of people who read at least one of the three magazines.
 - Find the number of people who read exactly one magazine.
- What is the cardinality of the following set on integers:
 $X = \{ n \mid 1 \leq n \leq 123 \text{ and } n \text{ is not divisible by } 2, 3 \text{ and } 5 \}$
- Let R be a non-empty relation on a collection of sets defined by $A R B$ if and only if $A \cap B$ is not null. Check the equivalence of the relation.
- Let $X = \{2, 3, 6, 12, 24\}$. Draw a hasse diagram for the partial ordered set defined by (X, \leq) .
- Prove using mathematical induction:
 - $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \dots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$
 - $2 + 2^2 + 2^4 + 2^6 + \dots + 2^n = 2^{n+1} - 2$
 - $n^4 - 4n^2$ is divisible by 3 for all $n \geq 2$
- State and prove Schroeder – Bernstein theorem.
- Find the inverse of the following functions:
 - $f(x) = 3x - 5$
 - $f(x) = x^3 - 7$
 - $f(x) = (x+2)/(x-3)$
 - $f(x) = \sqrt{x + 2}$

8. If $g(x) = 1-x$ and $h(x) = \frac{x}{1-x}$, then what will be $g \circ h$ and $h \circ g$?
9. Check if the following relation holds the properties of reflexive, irreflexive, symmetric, asymmetric, anti-symmetric, and transitivity or not?
- (a) $R = \{(1, 1), (2, 1), (2, 2), (2, 3), (2, 4), (3, 1), (3, 2), (3, 3), (3, 4)\}$ on the set $A = \{1, 2, 3, 4\}$
- (b) $\{(a,b) \text{ such that } a \text{ and } b \in \mathbb{Z} \text{ and } |a - b| < 10\}$
10. What is Euclidean algorithm? Find the GCD of following pairs using Euclid's algorithm:
- (a) 216 and 153
- (b) 1220 and 516