SMIT SIKKIM MANIPAL UNIVERSITY
SIKKIM MANIPAL INSTITUTE OF TECHNOLOGY

Engineering Mathematics III

Discrete Mathematics

Lecture 7

Maximal & Minimal Elements in Poset

This course is taught to Computer Science Engineering students in SMIT, India during Jun-Dec, 2019.

Totally Ordered Set

A partially ordered set is called **totally ordered set** is A is a chain. In this case, the binary relation $\leq$ is called as a **total ordering relation** .

Maximal & Minimal Elements

Let $(A, \leq)$ be a partially ordered set.

- An element $a \in A$ is called as a **maximal element** if for no $b \in A, a \leq b$ unless $a = b$.
- An element $a \in A$ is called a **minimal element** if for no $b \in A, b \leq a$ unless $b = a$.

Cover of an element

Let $(A, \leq)$ be a poset.

- An element $a \in A$ is said to **cover** an element $b \in A$ if $b \leq a$ and for no other element $c \in A$, $b \leq c \leq a$.

Upper Bound

- An element $c \in A$ is called as **upper bound** of two element a and b if $a \leq c$ and $b \leq c$. An element $c \in A$ is said to be a **least upper bound** of a and b if c is an upper bound of a and b and if there is no other upper bound d of a and b such that $d \leq c$.

Lower Bound

Let $(A, \leq)$ be a poset.

- An element $c \in A$ is called as **lower bound** of two element a and b if $c \leq a$ and $c \leq b$.
- An element $c \in A$ is said to be a **greatest lower bound** of a and b if c is an lower bound of a and b and if there is no other lower bound d of a and b such that $c \leq d$.

Questions?

Thank you