

Calculus - 1

Properties of Real Numbers and Bounds : lecture 5

Bounds, greatest lower bound and least upper bound

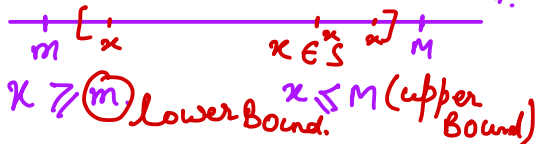
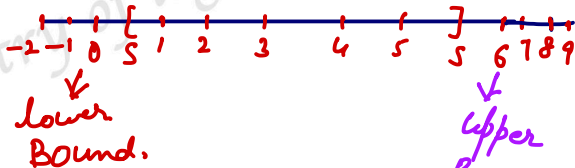
$$S = \{1, 2, 3, 4, 5\}$$

$$x \in S.$$

$$x \leq M.$$

M is upper Bound.

S is Bounded above



$$x \geq m.$$

m is lower Bound.

S is Bounded Below.

$$m \leq x \leq M.$$

A set which is Bounded Below and Bounded above is Bounded.

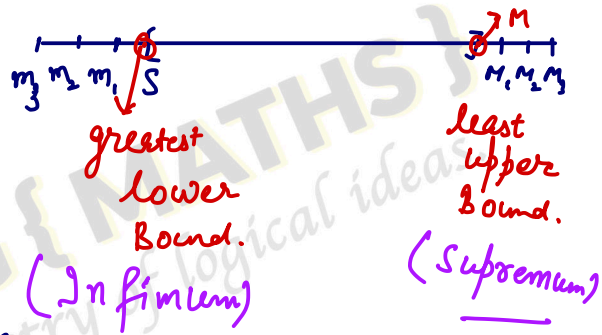
g.l.B \Rightarrow Greatest lower Bound.

→ Inf and Sup. value of a set is unique.

→ Order Completeness property

set of Bounded above then supremum exists.

A set is Bound Below then infimum exists.



find l.u.b and g.l.b.

$$S = \frac{2x-1}{x+4} \quad |x-5|=2$$

$$S = 2 - \frac{9}{x+4}$$

$$|x-5|=2$$

$$-2 < x-5 < 2$$

$$-2+5 < x < 2+5$$

$$3 < x < 7$$

$$3+4 < x+4 < 7+4$$

$$7 < x+4 < 11$$

$$\frac{1}{7} > \frac{1}{x+4} > \frac{1}{11}$$

$$\frac{-9}{7} < \frac{-9}{x+4} < \frac{-9}{11}$$

$$2 - \frac{9}{7} < 2 - \frac{9}{x+4} < 2 - \frac{9}{11}$$

$$\frac{5}{7} < \frac{2x-1}{x+4} < \frac{13}{11}$$



Inf. G.l.b $\rightarrow \frac{5}{7}$
Supremum!- l.u.b $\rightarrow \frac{13}{11}$