

A.P. SHAH INSTITUTE OF TECHNOLOGY

Department of Computer Science and Engineering Data Science

Semester: Subject: OS GT Academic Year: 2027-2023
Minimal Elements and Maximal Elements-
Let say we have a poset(s, R) where s is some arbitrary set and relation R is a partial order relation defined on sets.
Minimal element -
An element x of set S is called a minimal element if there is no y ES such that yRS (or (y,x) &R) and y &x.
ex: Consider the following Hasse Diagram.
de
a a is minimal element.
Here, b and c are not minimal because aRb and aRC.
similarly d and e are not minimal because, bRd and cRd.
also cre and bre also f is not minimal dement as drf, erf. but a is a minimal element ar no element i Subject Incharge:



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t t
Here,
a, c and e are
a c e minimal elements.
no element related to
a, c and e.
A poset can have more than 1 minim
element.
Maximal element -
Let say me have a poset (S,R) where
is some arbitrary set and relation R is
An element of acot sis cal
a maximal element it there is no y
a partial order relation defined on set An element x of a set s is can a maximal element if there is no y such that x Ry (or (x, y) & R) & x #
ex. \ a is not maxim
de element as arb,
deb, c also not
maximal element
as brd, bre, cr
a creidrfier
but f is maximal ele.
Subject Incharge: Page No Department of CSE-Data Science A f is not related to any element.

Semester:	T			
ex. (2)	5	ubject: _DSGT		Academic Year 2022-2023
CV. (5)	e	7.	f	
	1			e and f av
	9			maximal eleme
	100 1 1 1 1 1			begause e is
7 488 10	_ b \		C	not related to a element & fix related to any element
				element & + 15
		a	not	related to any el
elen 3 l.	news.	have m		than one man
elen 3 l.	news.	have m	Ei	nd minimal and
عاد ۱۱ (ع) ال	news.	have m	Ei	* .
elen 3 l.	newts.	have m	E),	nd minimal and
(3) l.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	g	E),	nd minimal and
ا اله اله اله اله اله اله اله اله اله ال	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	have m	Fi	nd minimal and naximal elements Minimal elements = a, b, c
3 t.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	g	Fi	nd minimal and naximal elements
3 t.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	g	Fi	nd minimal and naximal elements Minimal elements = a, b, c
3 l.		g	Fi	nd minimal and laximal elements Minimal elements = a, b, c Maximal elements
3 l.	b	g	Fig	Minimal elements = a, b, c Maximal elements = l, m



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1ets draw Hasse diago (§ 3, 5, 9, 15, 24, 45	g divide rel
3 and 5 are non com element and no elemen	parable/incomparable nt divides 3 and 5
So let put them place.	
45	Next element is
9 15	3 divides 9 next is 15
3 5	3 and 5 divides 1: 9 does not divide 15
	next is 24
5,15 does	not divide 24 not divide 24
noxt dement 45.	divide 24.
Top elements are 24 not divide 45 bi	ut 9 divides 43
also 15 divides l	() .

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Resultant	Hasse	dian	vet no a	
		7	16110	
	145			
	1		LIFIM	mal elements
24 2	19	15		24 845
-1	13/		Mini	mal elements
	1			= 3 and 5
	3	5	Maxi	mal elements
				= 24 & 45.
Tanas Car	. 1 .	.	11	0 17
Lower Bour	Jd C	ana	upper	bound)
	1			0 - 0 2 - v-b
Let say w	e hai	le a	poset	(S, R) such
that s is	an a	2011	any set	and Risa
partial order	degin	ed o	n set	5.
Also, let sa	y T	C 5.		
		1		
Lower Bound			v v	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
An elemen	+ x (ES_	15 0 10	ower bound
of set T if	AUE	TC	CIYDEF	ξ
1)	- 1			
Unger Bound	J -			
It An eleme	nt X	es	is an	upper bound
1 : -	*	GT (4,20	ER.
of set 1 1	19	1	1	
Y				

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ex	1) Find the subsets &	lower and upper to a, b, c ? & j, h ?	ana egy
	9	h	ets = {a,b,c}
	d .	e tile	¿a,c,d,4) ¿a,b,c} er bound=
5000		but be	a RC a not lower bound of relate to a & c
		upper bound-	apper bound.
ii	ower bound	l= f d a b c	
Ü	apper bound	= j&haser lement = ø.	not related to

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Semester :		DS 4T Academic Year 2022 2023	
iii} ¿a,c	, 1, + 4		
lower	bound =	<u> </u>	
abber 1	sound =	filh	
(2)			
Cla	m	and upper bounds	
1	1	tind appear bounds of sa, b, cy also find all the	
		rules find all the	
	1	lower bounds	
d	·e ·f	1-f,g,h3.	
0	1		
b			
- upper b	ounds of	¿a,b,c³ is k,l,m	
lower	pounds of	¿figihì is \$	
) find all	upper bo	ounds of 22,93 and all	
lower box	inds of	£60,723 for the	
poset (2	2,4,6,6	ounds of 22,93 and all £60,723 for the ,12,18,27,36,48,60,723,1)
		• 72	
60	48	36 upper bounds of \$2,93 are 18,36	
		18 £2,99 are 18,36	,7
	12	27 10wer bounds of 260,723 = 12,6	
	4 6	9 260,723 = 12,6	,4,
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