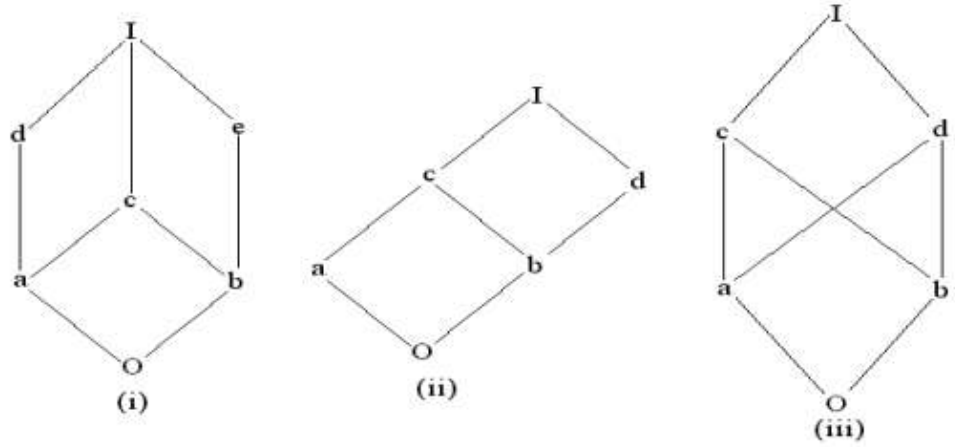
Jaypee Institute Of Information Technology
ODD Semester 2022
Theoretical Foundation of Computer Science(CI212)
Tutorial 5

Topic: Relations and Functions

Ques 1:

Which of the partially ordered sets in figures (i), (ii) and (iii) are lattices? Justify your answer.



Ques 2: How many non-zero entries does the matrix representing the relation R on A={1,2,3,…100} consisting of the first 100 positive integers have if R is

a) $\{(a, b) \mid a > b\}$? **b)** $\{(a, b) \mid a \neq b\}$?

Ques 3: Find the transitive closures of these relations on { 1 , 2 , 3 , 4 } .
a) { (1 , 2) , (2 , 1) , (2 , 3) , (3 , 4), (4 , 1) }
b) { (2 , 1) , (2 , 3) , (3 , 1) , (3 , 4), (4 , 1) , (4, 3) }
c) { (1 , 2) , (1 , 3) , (1 , 4) , (2 , 3) , (2 , 4), (3 , 4) }
d) { (1, 1) , (1 , 4) , (2 , 1) , (2 , 3) , (3 , 1) , (3 , 2) , (3 , 4) , (4 , 2)}

Ques 4: Why is f not a function from R to R if:

a) $f(x) = 1/x$?
b) $f(x) = \sqrt{x}$?
c) $f(x) = \pm\sqrt{(x^2 + 1)}$?

Ques 5: Determine whether each of these functions is a bijection from R to R.

a) $f(x) = 2x + 1$
b) $f(x) = x^2 + 1$
c) $f(x) = x^3$
d) $f(x) = (x^2 + 1)/(x^2 + 2)$

Ques 6: Suppose that g is a function from A to B and f is a function from B to C.
a) Show that if both f and g are one-to-one functions, then fog is also one-to-one.
b) Show that if both f and g are onto functions, then fog is also onto.

Ques 7:
(a) How many functions are there from X={1,2} to Y={a,b,c}?
(b) How many of these functions are one-to-one?
(c)How many of these functions are onto?

Ques 8: Find *fog*, *gof*, *f+g* , *fg* for the functions $f(x) = x^2 + 1 \;\; g(x) = x + 2$