9.6

12. Because (S,R) is a poset, we know R is reflexive, so R^{-1} is reflexive. If $(a,b)\in R^{-1}$ and $a\neq b$, we know $(b,a)\in R$, because $(a,b)\in R^{-1}$, $(b,a)\notin R^{-1}$, $b\neq a$, so R^{-1} is antisymmetry. If $(a,b)\in R^{-1}$, $(b,c)\in R^{-1}$, then $(b,a)\in R$, $(c,b)\in R$, because R is transitive, we get $(c,a)\in R$, then $(a,c)\in R^{-1}$, we know R^{-1} is transitive. So (S,R^{-1}) is also a poset

22. a)

b)

c)

d)

28. For example, $(2,6)\in R$, $(6,12)\in R$, $(2,12)$ is not in the covering relation. So we can know the covering relation has: $(1,2)$, $(1,3)$, $(2,4)$, $(2,6)$, $(3,6)$, $(4,12)$, $(6,12)$

35. a) $\{1,3,4\}$, $\{2,3,4\}$, $\{1,2\}$

b) $\{1\}$, $\{2\}$, $\{4\}$

c) No

d) No

e) $\{2,4\}$, $\{2,3,4\}$

f) $\{2,4\}$

g) $\{3,4\}$, $\{4\}$

h) $\{3,4\}$

44. a) The poset is not a lattice, because 6 and 9 don't have a upper bound

b) The poset is a lattice. Because each element can divides the next one. So every pair of elements has both a least upper bound and greatest lower bound.

c) The poset is a lattice, since it has a liner order. We can know the least upper bound of the two elements is the smaller. The greast lower bound is the lager number.

d) The poset is a lattice. If A and B are the power sets of set S, Then the least upper bound is $A\cap B$, the greast lower bound is $A\cup B$

抽象代数

20. (a) No, it's not a commutative operation. Because $a*b=c$, $b*a=a$, so $a*b\neq b*a$

(b) $a*(b*c)=a*c=b$

$(a*b)*c=c*c=b$

(c) No, It's not an associative operation

For example, $c*(b*a)=c*a=c$, $(c*b)*a=a*a=b$

So $c*(b*a)\neq(c*b)*a$

24. 2^{n^2}

26. (a)

*	a	b
a	a	a
b	a	a

①

*	a	b
a	b	a
b	a	a

②

*	a	b
a	a	b
b	a	a

③

*	a	b
a	a	a
b	b	a

④

*	a	b
a	a	a
b	a	b

⑤

*	a	b
a	a	a
b	a	a

⑥

*	a	b
a	b	a
b	b	a

⑦

*	a	b
a	b	a
b	a	b

⑧

*	a	b
a	a	b
b	b	a

⑨

*	a	b
a	a	b
b	a	b

⑩

*	a	b
a	a	a
b	b	b

⑪

*	a	b
a	b	b
b	b	a

⑫

*	a	b
a	b	b
b	a	b

⑬

*	a	b
a	a	b
b	b	b

⑭

*	a	b
a	b	a
b	b	b

⑮

*	a	b
a	b	b
b	b	b

⑯

c) ①、②、⑤、⑧、⑨、⑫、⑭、⑯ are commutative.

28. Because $a \leq a$, then $a = a * a$, so $\leq$ is reflexive. If $a \leq b$ and $b \leq a$, then $b = a * b$, $a = b * a$, $a * b = b * a$, so $\leq$ is antisymmetry.

If $a \leq b$ and $b \leq c$, then $a \leq c$. $a = a * b = a * (b * c) = a * c$, so we know $\leq$ is transitive. So $(A, \leq)$ is a poset.

$a = a * b = a * (a * b) = a * (a * b)$, so $a \leq a * b$. Same, $b \leq a * b$.

So $a * b$ is the upper bound of a and b. If $c \geq a$ and $c \geq b$, $a * b = a * (b * c) = (a * b) * c$, so $a * b \leq c$. Then we know

$LUB(a, b) = a * b$