Student Information

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Answer 1

$(\overline{A \setminus B}) \cap (\overline{B \setminus A})$
{x | ¬(x∈(A\ B))∩ ¬(x∈(B\ A))}
{x | ¬(x∈(A ∩ $\overline{B}$))∩ ¬(x∈(B ∩ $\overline{A}$))}
{x | ¬(x∈A ∧ x∉B) ∧ ¬(x∈B ∧ x∉A)}
{x | (x∉A ∨ x∈B) ∧ (x∉B ∨ x∈A)}
{x | ((x∉A) ∧ (x∉B ∨ x∈A)) ∨ ((x∈B) ∧ (x∉B ∨ x∈A))}
{x | (((x∉A) ∧ (x∉B)) ∨ ((x∉A) ∧ (x∈A))) ∨ (((x∈B) ∧ (x∉B)) ∨ ((x∈B) ∧ (x∈A)))}
{x | ((x∉A) ∧ (x∉B)) ∨ ((x∈B) ∧ (x∈A))}
{x | ¬((x∈A) ∨ (x∈B)) ∨ ((x∈B) ∧ (x∈A))}
{x | x∈((A∩B)∪($\overline{A \cup B}$)}
(A∩B) ∪ ($\overline{A \cup B}$)

Answer 2

a)
{ a,b | (a∈ A∩B) ∧ (b∈ C∩D)→ (a∈A ∧ b∈C)∩(a∈B ∧ b∈D)}
{ a,b | (a∈A ∧ a∈B) ∧ (b∈C ∧ b∈D)→ (a∈A ∧ b∈C)∧(a∈B ∧ b∈D)}
{ a,b | (a∈A) ∧ (b∈C) ∧ (a∈B) ∧ (b∈D)→ (a∈A) ∧ (b∈C) ∧ (a∈B) ∧ (b∈D)}
b)
Suppose that g is not onto but g∘f is onto
There is an element z_1 ∈Z such that g(y)≠ z_1 , ∀y , y∈Y
Suppose x_1 ∈X , y_1 ∈Y and f(x_1) = y_1
g(y_1) ≠ z_1 then g(f(x_1)) ≠ z_1 then g∘f(x_1) ≠ z_1
∀x , x∈X , g∘f(x) ≠ z_1 then g∘f is not onto
It is a contradiction
So, if g∘f is onto, then g must be onto

Answer 3

{x,y | f(x)=y , x ∈ f^{-1}(A∪B) , y ∈(A∪B)}
(y ∈ (A∪B)) ↔ (f(x)∈A ∨ f(x)∈B)
(f(x)∈A ∨ f(x)∈B) ↔ (x∈ f^{-1}(A) ∨ x∈ f^{-1}(B))

(x$\in$ f^{-1}(A) $\vee$ x$\in$ f^{-1}(B)) = f^{-1}(A) $\cup$ f^{-1}(B)

Answer 4

a)
n is odd positive, then n=2m+1 m $\in$Z
n^2-1 = (n-1)(n+1) = (2m)(2m+2) = 4(m)(m+1)
One of (m) and (m+1) is even, then m(m+1) is dividible by 2
4m(m+1) = (n^2-1) is dividible by 8
b)
k is an integer, a=2nk+b
a^2=4n^2k^2 + b^2 + 4nkb
a^2=4n(k^2+k) + b^2
$a^2 \equiv b^2$(mod4n)

Answer 5

Answer 6

(x.y).(x.z) = lcm(x.y,x.z).gcd(x.y,x.z)
lcm(x.y,x.z) = x^2.y.z / gcd(x.y,x.z) = x^2.y.z / x.gcd(y,z) = x.y.z / gcd(y,z)
x.y.z = x.gcd(y,z).lcm(y,z)
x.gcd(y,z).lcm(y,z) / gcd(y,z) = x.lcm(y,z)