Prob. Let A,B,C be any three sets, then prove that-

$AX(B\cap C) = (AXB) \cap (AXC)$

Solution:

$(x,y) \in Ax(B\cap C)$

$x\in A$ and $(y\in(B\cap C))$

$x\in A$ and $(y\in B$ and $y\in C)$

$(x\in A$ and $y\in B)$ and $(x\in A$ and $y\in C)$

$(x,y) \in (A \times B)$ and $(x,y) \in(A \times C)$ // by Cartesian Product.

$(x,y) \in (AxB)\cap(AxC)$

Prob. Prove that-

$A\cap(B\cup C) = (A\cap B) \cup (A\cap C)$

Solution:

Let $x \in A \cap (B \cup C)$.

Then $x \in A$ and $x \in (B \cup C)$.

$(x \in A$ and $x \in B)$ or $(x \in A$ and $x \in c)$.

$x \in (A$ and $B)$ or $x \in (A$ and $c)$.

$x \in (A \cap B) \cup (A \cap C)$.

Prob. If A, B, C, D are any four sets then prove that –

$(A\cap B)X(C\cap D) = (AXC)\cap(BXD)$

Solution:

Consider(x,y)

$(x,y) \in (A \cap B) \times (C \cap D)$

$x \in (A \cap B) \wedge y \in (C \cap D)$

($x \in A$ and $x \in B$) $\wedge$ ($y \in C$ and $y \in D$)

($x \in A \wedge y \in C$) and ($x \in B \wedge y \in D$)

$(x,y) \in (A \wedge C)$ and $(x,y) \in (B \wedge D)$

$(x,y) \in ((A \wedge C)$ and $(B \wedge D))$

$(x,y) \in ((A \times C) \cap (B \times D))$

$(A \times C) \cap (B \times D)$

Prob. Show that-

$(P \cap Q) X (R \cap S) = (PXR) \cap (QXS)$

For some arbitrary sets P, Q, R and S

Solution:

Consider(x,y)

$(x,y) \in (P \cap Q) X (R \cap S)$

$x \in (P \cap Q) \wedge y \in (R \cap S)$

($x \in P$ and $x \in Q$) $\wedge$ ($y \in R$ and $y \in S$)

($x \in P \wedge y \in R$) and ($x \in Q \wedge y \in S$)

$(x,y) \in (P \wedge R)$ and $(x,y) \in Q \wedge S)$

$(x,y) \in ((P \wedge R)$ and $(Q \wedge S))$

$(x,y) \in ((P \times R) \cap (Q \times S))$

(PXR)∩(QXS)

Related Posts:

1. SET
2. Mathematical induction
3. Net 34
4. prove that- AX(B∩C) = (AXB) ∩ (AXC)
5. Prove that- A∩(B∪C) = (A∩B) ∪ (A∩C)
6. prove that – (A∩B)X(C∩D) = (AXC)∩(BXD)
7. Show that- (P∩Q)X(R∩S) = (PXR)∩(QXS)
8. Binary operations
9. Algebraic structure
10. Group
11. Show that (…, -4, -3, -2, -1, 0, 1, 2, 3, 4,…} is group
12. Show that a*b=b*a
13. if a*c = c*a and b*c = c*b, then (a*b)*c = c*(a*b)
14. Undirected Graph and Incident Matrix
15. Prove the following by using the principle of mathematical induction for all $n \in N$, $1^3 + 2^3 + 3^3 + \ldots + n^3 = [n (n + 1)/2]^2$
16. Prove that G={−1,1,i,−i} is a group under multiplication.
17. Hasse diagram for the “less than or equal to” relation on the set S= { 0,1,2,3,4,5}