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Homework #1

Q6. $A \oplus B = (A \cup B) - (A \cap B)$

$A \oplus B = (x \in A \vee x \in B) \wedge x \notin A \cap B$

$[x \in A \wedge x \notin B] \wedge [x \in B \wedge x \notin A]$

$(x \in A - B) \wedge (x \in B - A)$

$(A - B) \cup (A \cap B)$

$(A \cup B) - (A \cap B)$

Q8 a. (A – B) – C = (A – C) – (B – C)

RHS

x $\in (A - C) - \ x \ \notin (B - C)$

x $\in A \ \wedge x \ \notin C - x \ \notin B \wedge x \ \in C$

x $\in A \ \wedge x \ \notin B \ \wedge x \ \notin C$

LHS

x $\in (A - B) - \ C$

x $\in A \ \wedge$ X $\notin B \ \wedge x \ \notin C$

LHS = RHS

Q8 b. A – (B – C) = (A – B) – C

RHS

x $\in (\ A - B) - \ C$

x $\in A \ \wedge x \ \notin B \ \wedge x \ \notin C$

LHS

x $\in A - (B - C)$

x $\in A - x \ \notin (B - C)$

x $\in A - x \ \notin B \ \wedge x \ \in C$

x $\in (A \ \cap C) \wedge x \ \notin B$

LHS $\neq \boldsymbol{RHS}$

Q2 a. Prove that Q1 ∉ Q1

By using Russell's paradox

J = {A|A is a set of A ∉ A}

By using this property:

Q1 = {A|A is a set and A ∉ A}

So, Q1 ∈ J using Russells paradox Q1 ∉ Q1 since they don't belong to themselves.

Hence Proved!

b. We have to prove that set Q1 is a paradox that means it is self-contradicted.

By using Russell's paradox

Let's consider that a set J which includes some elements but not all of them.

The proposition specifies Q1 ∉ Q1 as the property and some that means that it differs from the one in the only by the inclusion part.

If for example "JAY" then "J" is an element of itself. Based on the property part of the proposition "J" should be it the property of J ∉ J. Which is similar as

$\{Q1\} \in Q1\} \leftrightarrow \{Q1\}$ ∉ Q1

Hence Proved!