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In Class Problems 4
Problem 2a

Prove \heartsuit is a binary set on $P(A)$.

Let A be a set and consider \heartsuit on $P(A)$ given by $S\heartsuit T = (S\setminus T) \cup (T\setminus S)$.

Let S and T be non empty sets.

Based upon definition 10 in Fact 5.1.5 on page 86 of our illustrious textbook, \setminus is a binary operation on $P(A)$.

Thus $(S\setminus T)$ and $(T\setminus S)$ are both binary operations on $P(A)$.

Taking special note of definition 8 in Fact 5.1.5 on page 86 of the highly recommended *Foundations of Mathematics* textbook, \cup is a binary operation on $P(A)$. Therefore $(S\setminus T) \cup (T\setminus S)$ is a binary operation on $P(A)$.

Thus we see that \heartsuit is a binary operation on $P(A)$.