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Step1:

Set-Partition $\in$ NP: Let guess the partitions and verify that the two have equal sums.

Step2: Reduction of subset-sum to Set-Partition

Recall subset-sum is defined as follows: Given a set X of integers and a target number t, find a subset $Y \subseteq X$ such that the members of Y add up to exactly t. Let s be the sum of members of X. Feed $X' = X \cup \{s-2t\}$ into set-Partition. Accept if and only if set partition accepts.

Step3: This reduction clearly works in polynomial time.

Step 4: We will prove that $\langle X, t\rangle \in$ subset-sum iff $\langle X'\rangle \in$ set-partition. Note that the sum of members of X' is $2s-2t$.

If there exist a set of numbers in X that sum to t, then the remaining numbers in X sum to $s-t$. Therefore, there exists a partition of X' into two such that each partition sums to $s-t$.

Let's say that there exists a partition of X' into two sets such that the sum over each set is $s-t$. One of these sets contains the number $s-2t$. Removing this number, we get a set of numbers whose sum is t and all of these numbers are in X.