Let $< S, t >$ be an arbitrary input for the SUBSET-SUM problem. Let $U = S \cup \{sum(S) - 2t\}$ where sum(S) denotes the sum over the elements of S. Then $< S, t > \in$ SUBSET-SUM iff $< U > \in$ SET-PARTITION and thus SUBSET-SUM $\leq_P$ SET-PARTITION.

Trivially, this reduction will run in polynomial time as it does nothing more than adding a single element to a set. I will prove that this reduction also works by proving both directions separately. First I will proof $< S, t > \in$ SUBSET-SUM $\rightarrow < U > \in$ SET-PARTITION:

Let S' be the subset of S such that $\sum_{x \in S'} x = t$. Then let U' be $S' \cup \{sum(S) - 2t\}$ so U/U' will be S/S'. Since the sum over S' equals t, the sum over U' will be $t + sum(S) - 2t = sum(S) - t$. Also, the sum over $U/U' = S/S'$ equals $sum(S) - t$. Thus indeed $< S, t > \in$ SUBSET-SUM $\rightarrow < U > \in$ SET-PARTITION.

Now the other direction: $< U > \in$ SET-PARTITION $\rightarrow < S, t > \in$ SUBSET-SUM:

Let U' be a subset of U such that $\sum_{x \in U'} x = \sum_{x \in U/U'} x$ and $sum(S) - 2t \in U'$. Such a U' must exist because $< U > \in$ SET-PARTITION and $sum(S) - 2t \in S$. Since the sum over U' is the same as the sum over U/U', it must be that the sum over U' is half of the sum over U. So the total sum over U is $2 * sum(S) - 2t$ so the sum over U' is $sum(S) - t$. Let S' be $U'/\{sum(S) - 2t\}$. Then the sum over S' will be $sum(S) - t - (sum(S) - 2t) = sum(S) - t - sum(S) + 2t = t$. Since S' contains only elements of S (so $S' \subseteq S$) and the sum over S' equals t, it holds that indeed $< S, t > \in$ SUBSET-SUM.

With both directions of the iff proven, it indeed holds that $< S, t > \in$ SUBSET-SUM iff $< U > \in$ SET-PARTITION and thus SUBSET-SUM $\leq_P$ SET-PARTITION.