

2005 Senior round 2, Q3 solution: Observe that S has a total of $\binom{10}{2} = 45$ 2-element subsets, giving rise to a total of 45 sums. The values of these sums ranges from 3 to 47, both inclusive. If the values 3 and 47 are both present, then 1, 2, 23, 24 are in S . Then the sets $\{1, 24\}$ and $\{2, 23\}$ both have the sum 25. If not, then there are only 44 possible values for the sums. Thus, by the pigeonhole principle, two of sums are equal.