1077-VJ-1409 **Oleg Lazarev*** (`olazarev@princeton.edu`). *Distribution of Missing Sums in Sumsets.*
For any finite set of integers A, define its sumset $A + A$ to be $\{x + y : x, y \in A\}$. In a recent paper, Martin & O'Bryant studied sum-dominant sets, where $|A + A| > |A - A|$. They prove a positive percentage of all sets are sum-dominant, and investigate the distribution of $|A+A|$ given the uniform distribution on subsets $A \subseteq \{0, 1, \ldots, n-1\}$. They also conjecture the existence of a limiting distribution for $|A + A|$ and show that the expectation of $|A + A|$ is $2n - 11 + O((3/4)^{n/2})$.

Using a graph-theoretic framework, we derive an explicit formula for the variance of $|A + A|$ in terms of Fibonacci numbers. We also prove exponential upper and lower bounds (independent of n) for the distribution of $|A + A|$. These bounds are based on bounds on probabilities like $P(k + a_1, \cdots,$ and $k + a_m \notin A + A)$, which we show are approximately exponential in k for fixed $a_1, \cdots, a_m$. Finally, we show that $P(k, k + 1, \cdots, k + m \notin A + A)$, the probability of $A + A$ missing a block of consecutive elements, is approximately $(1/2)^{(k+m)/2}$ for large m, k. This approximation implies that essentially the only way for $A + A$ to miss a consecutive block of $m + 1$ elements starting at k is to miss all elements up to $k + m$. (Received September 19, 2011)