

1. Suppose you have a red die and a blue one. The faces of each are number from 1 to 6. When you throw them each face is equally likely to be up. When you throw both dice, what is the probability that the sum of twice the number on the red die and the number on the blue die is 6?
2. Simplify $\sum_{0 \leq i \leq n} i^4$.
3. Simplify $\sum_i \binom{n}{i} \binom{i}{k}$.
4. The sum $\sum_{0 \leq i \leq n} i^4 3^i$ has a closed form expression, but it is rather complicated. For the case where n is large, find the most important term in the closed form. Use big O notation to express this sum, giving the most important term explicitly.