

Give all answers in the simplest form that you can.

1. Simplify $\sum_{10 \leq i \leq 1000} i$.

2. Simplify $\sum_{1 \leq i} \lfloor 1000/i \rfloor$.

3. You have one coin that comes up heads 1/3rd of the time. You have a second coin that comes up heads 2/3rds of the time. If you flip both coins n times, how likely is the first coin to come up heads more often than the second coin.

4. Simplify $\sum_{i,j,k} x^i \binom{n}{i,j,k}$.

5. Simplify $\sum_i \binom{n}{2p+2i+1} \binom{p+i}{i}$.