

1. Suppose you have an urn with 10 red balls and 10 black balls and you randomly take two balls from the urn (without replacement). What is the probability that you select one red ball and one black ball? (The order in which the balls are selected does not matter.)
2. How many additions of number of matrices are done by the Classical Matrix Multiplication algorithm (Algorithm 1.9). Count only the additions that involve matrix elements.
3. Simplify  $\sum_i i(i+a) \binom{n}{i}$ .
4. Simplify  $\sum_i \frac{\binom{n}{i}^3}{\binom{n-1}{i-1}}$ .
5. Give an algorithm that is fast and simple for computing a table of Stirling numbers of the second kind.
6. Suppose you are using the Hashing with Chaining Algorithm (Algorithm 3.1). Suppose you are looking up items in the table and the relative frequency of looking up the  $i^{\text{th}}$  item that was put in the table is  $1/i$ . What is the average number of cells searched? (Note that the assumptions of this problem are artificial. A more realistic assumption would be that the items were added from a random list of items where each item was occurring with the same relative frequency as used in the look up process.)