**Problem 1)** A fair coin is tossed $n$ times. Given that there were $k$ heads. What is the probability that the first toss was heads? *Bonus: What if the coin were biased heads with probability $p$?*

**Problem 2)** You have $r$ red balls and $w$ white balls in a bag. You continue to draw balls from the bag until the bag contains a ball of only one color. What is the probability that you run out of white balls first?

**Problem 3)** There are 100 noodles in a bowl. At each step you randomly select two noodle ends from the bowl and tie them together. What is the expected number of closed loops you end up with?

**Problem 4) Meta** Given a set of points $P$ in the 2D plane. Write a program to determine the $k$ closest points to the origin. Test it here!

**Problem 5) Palantir** Given positive integer $n$ , find the smallest number of perfect squares that sum to $n$. For examples, for $n = 7$, you should return 4 since $7 = 4+1+1+1$. For $n = 13$ you should return 2 since $13 = 9 + 4$.

**Problem 6) Meta (From Shagun)** Given an integer array `A`, return all the triplets $(\texttt{A}[i], \texttt{A}[j], \texttt{A}[k])$ such that $i \neq j$, $i \neq k$, and $j \neq k$, and $\texttt{A}[i] + \texttt{A}[j] + \texttt{A}[k] = 0$. Notice that the solution set must not contain duplicate triplets.Test it here!