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Homework Problem: More Coin Tossing

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Homework Problem: More Coin Tossing

10/10 points (graded)

Consider a sequence of independent coin tosses, and let θ be the probability of heads at each toss.

Fix some k and let N be the number of tosses until the k th head occurs. Find the ML estimator $\hat{\theta}$ of θ based on N (i.e., the only observation you have is seeing N once). Express your answer in terms of k and N .

Hint: You'll first want to derive what the probability table $p_N(\cdot; \theta)$ is. By how the problem is set up, if the n -th toss is for sure the k -th heads, then what is the probability of any particular sequence that has k heads, and how many sequences are there for which the n -th toss is precisely the first toss for which we see the k -th heads?

Please provide your answer as a mathematical formula (and not as Python code). Use \wedge for exponentiation, e.g., x^2 denotes x^2 . Explicitly include multiplication using $*$, e.g. $x*y$ is xy .



$\frac{k}{N}$

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