Task. South african captain lost the toss of a coin 13 times out of 14. Find the chance of this happening is?

Proof. Let X be the random variable equal to the number of wins the toss of a coin out of 14 tosses. Assuming that the chances to loss and to win are equal, so their probabilities are equal to 0.5, we obtain that X ras binomial distribution with $n = 14$ $p = 0.5$, and $q = 1 - p - 0.5$. Hence the chance to lost k times out of n is equal to

$$P(X = k) = C_n^k p^{n-k} q^k,$$

where

$$C_n^k = \frac{n!}{k!(n-k)!}$$

is the binominal coefficient, and $k! = k(k-1)\cdots 2 \cdot 1$.

For $k = 13$ we obtain that

$$P(X = 13) = C_{14}^{13} \cdot 0.5^1 \cdot 0.5^{13} = \frac{14!}{13! \cdot 1!} \cdot 0.5^{14} = \frac{14 \cdot 13 \cdots 2 \cdot 1}{13 \cdots 2 \cdot 1 \cdot 1} \cdot 0.5^{14} = 14 \cdot 0.5^{14} \approx 0.00085449.$$