Question #39479, Math, Other

Suppose you toss a coin 4 times what is the probability that you get four tails? Write the probability as a fraction.

Solution

We consider a sequence of experiments, each of which results in either a "success" or a "failure". Let E_i, $i \geq 1$, denote the event that the i-th experiment results in a success. If, for all i_1, i_2, ..., i_n,

$$P\left(E_{i_1} E_{i_2} \ldots E_{i_n}\right) = \prod_{j=1}^{n} P\left(E_{i_j}\right) \qquad (1)$$

we say that the sequence of experiments consists of independent trials.

The successive flips of a coin consist of independent trials if we assume (as is usually done) that the outcome on any flip is not influenced by the outcomes on earlier flips. A "success" might consist of the outcome tails and a "failure" heads.

Since $n = 4$, $P(E_i) = 1/2$, for i = 1, 2,3, 4, from the formula (1) we have

$$P(E_1E_2E_3E_4) = (1/2)^4 = 1/16.$$

Answer: 1/16