

Question #6968 A coin is tossed 10,000 times, and it lands on heads 5180 times. Would you say that the coin is biased? How would you formulate your null and alternative hypothesis?

Solution. Use chi-squared test. Denote by p — the probability of head to appear in tossing. $H_0 : p = 0.5$, $H_1 : p \neq 0.5$. The statistics of this test is $T = \frac{(5000 - 5180)^2}{5000} + \frac{(4820 - 5000)^2}{5000} = 12.96$. The critical value that refers to the significant level $\alpha = 0.05$ equals to 0.95-quantile of chi-square distribution with **one** degree of freedom — 3.84. $T > 3.84$. Hence the coin is biased.