

## Question #65387, Math / Statistics and Probability

To determine if a single die is balanced or fair, the die was rolled 600 times. The observed frequencies with which each of the six sides of the die turned up are recorded in the following table:

Face 2 3 4 5 6

observed frequency 114 92 84 101 107 102

Is there sufficient evidence to conclude, at the %5 level of significance, that the die is not fair?

**Answer.**

To answer this question we should use Chi-squared test of goodness of fit.

	1	2	3	4	5	6
Expected	100	100	100	100	100	100
Observed	114	92	84	101	107	102

Null hypothesis  $H_0$ : All faces are uniformly distributed.

Alternative hypothesis  $H_a$ : All faces are not uniformly distributed.

Test statistic

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} = \frac{1}{100} [14^2 + 8^2 + 16^2 + 1^2 + 7^2 + 2^2] = 5.7$$

P-value for  $\chi^2 = 5.7$ ,  $df = 5$ :  $p = 0.3365$ .

Since P-value is greater than 0.05, we can't reject the null hypothesis and should conclude that the die is fair.

