Assignment 10

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Outline

Problem

Example 8.31

A die is tossed 102 times, and the i^{th} face shows $k_i = 18,15,19,17,13$ and 20 times. Test the hypothesis that the die is fair with $\alpha = 0.05$ using the chi-square test.

Solution

The expected value (E) for every i^{th} face $= 102/6 = 17$.

Observed Values (O)	Expected Values (E)	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
18	17	1	1	$\frac{1}{17}$
15	17	-2	4	$\frac{4}{17}$
19	17	2	4	$\frac{4}{17}$
17	17	0	0	0
13	17	-4	16	$\frac{16}{17}$
20	17	3	9	$\frac{9}{17}$

$$\Sigma\frac{(O-E)^2}{E} = 34/17 = 2 \tag{1}$$

$$\chi^2 = 2 \tag{2}$$

Solution

Each face of the die is a category, so we have 6-1 $= 5$ degrees of freedom with $\alpha = 0.05$. Hence,

$$\chi^2_{critical} = 11.07 > \chi^2 \tag{3}$$

Hence, we fail to reject the null hypothesis.