Assignment: Goodness of Fit Test

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1. Test an octahedral die whether it is unbiased or not with following data using goodness of fit test:

Score	1	2	3	4	5	6	7	8
Frequency	7	10	11	9	12	10	14	7

Solution:

Null hypothesis: H_0 : Die is unbiased
Alternative hypothesis: H_1 : Die is not unbiased

$Score$	$Observed\ frequency$	$Expected\ frequency$
1	7	10
2	10	10
3	11	10
4	9	10
5	12	10
6	10	10
7	14	10
8	7	10

$$\chi^2 = sum\ of \frac{(Observed\ frequency - Expected\ frequency)^2}{Expected\ frequency}$$

$$\chi^2 = \sum_{k=1}^{n} \frac{(O_k - E_k)^2}{E_k}$$

$$\begin{aligned}\chi^2 = \sum_{k=1}^{8} \frac{(O_k - E_k)^2}{E_k} &= \frac{(7-10)^2}{10} + \frac{(10-10)^2}{10} + \frac{(11-10)^2}{10} + \frac{(9-10)^2}{10} \\ &\quad + \frac{(12-10)^2}{10} + \frac{(10-10)^2}{10} + \frac{(14-10)^2}{10} + \frac{(7-10)^2}{10} \\ &= 4\end{aligned}$$