CS605A

ADITYA RAGHUWANSHI 170052

CHI-SQUARE

i) define random var. X s.t.,

$$X = \begin{cases} 1, & \text{if } i^{th} \text{ roll has value 'i'} \\ 0, & \text{Not i} \end{cases}$$

$E[X] = 1.\ P(i^{th} \text{ roll has value } i) + 0.(\text{otherwise})$

$= P(i^{th} \text{ roll has value } i)$

$= \boxed{\frac{1}{6}}$ Ans

ii) Chi-square statistic $\chi^2 = \sum_{i=1}^{k^2} \frac{(O_i - E_i)^2}{E_i}$

$$\chi^2 = \underbrace{\frac{(O_1 - E_1)^2}{E_1}}_{\text{success}} + \underbrace{\frac{(O_2 - E_2)^2}{E_2}}_{\text{failure}}$$

$$= \frac{(9 - 10/6)^2}{10/6} + \frac{(1 - 50/6)^2}{50/6}$$

$$= \left(\frac{44}{6}\right)^2\left(\frac{6}{10}\right) + \left(\frac{44}{6}\right)^2\left(\frac{6}{50}\right)$$

$$= \left(\frac{44}{6}\right)^2 \frac{x\,36}{50}$$

$$= \frac{(44)^2}{50} = \boxed{38.72}$$