PROBABILITY

T SIVA PARVATHI - FWC22089

13.4.5 [1] Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as

(a) number greater than 4

(b) six appears on at least one die

Solution: Given that a die tossed two times,

Variable	Values	Description
n	2	Number of tosses of a die
X_1	{1,2,3,4,5,6}	1st toss outcomes of a die
X_2	{1,2,3,4,5,6}	2st toss outcomes of a die
p_1	$\frac{1}{3}$	$\Pr(X > 4)$
q_1	$1 - p_1$	$\Pr(X \leq 4)$
p_2	$\frac{1}{6}$	$\Pr(X = 6)$
q_2	$1 - p_2$	$\Pr(X \neq 6)$

Table 2: Variable Description

Refer 2 for numericals,

(a) number greater than 4

X_1 and X_2 are independent events, so the desired outcome is

$$X = X_1 + X_2 \tag{13.4.1.1}$$

In n Bernoulli trials with k success and $(n-k)$ failures, the probablity of k success in n-Bernoulli trials can be given as,

$$p_{X_i}(k) = \begin{cases} {}^nC_k p^k q^{n-k} & 0 \leq k \leq n \\ 0 & \text{otherwise} \end{cases} \tag{13.4.1.2}$$

Probability distribution of getting number greater than 4,

$$p_X(k) = {}^nC_k {p_1}^k {q_1}^{n-k}, 0 \leq k \leq 2 \tag{13.4.1.3}$$

(b) six appears on at least one die

X_1 and X_2 are independent events, so the desired outcome is

$$X = X_1 + X_2 \tag{13.4.2.4}$$

Probability distribution of getting six on atleast one die is,

$$p_X(k) = {}^nC_k {p_2}^k {q_2}^{n-k}, 0 \leq k \leq 2 \tag{13.4.2.5}$$

[1] Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)

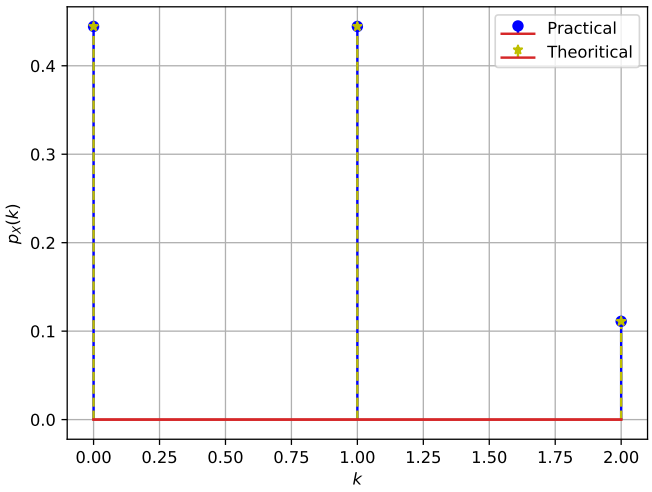

Figure 1: Stem plot for the distribution $\Pr(X > 4)$

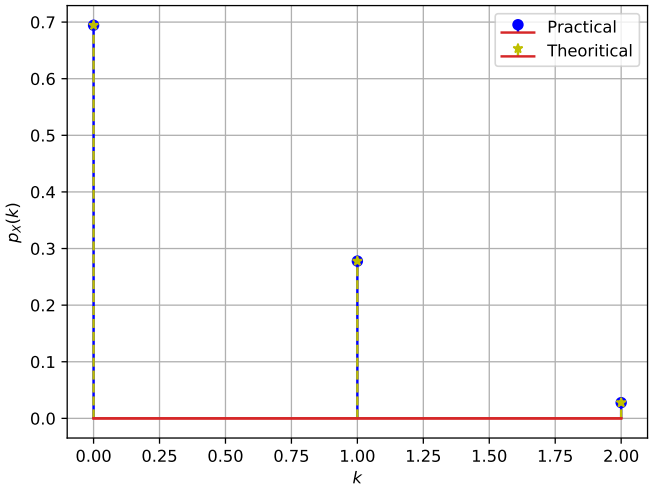

Figure 2: Stem plot for the distribution $\Pr(X = 6)$