Assignment:- 3

AI1110: Probability and Random Variables
Indian Institute of Technology, Hyderabad

CS22BTECH11017

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Exercise 12.13.1.14 Given that 2 numbers appearing on throwing two dice are different. Find the probability of the event ' the sum of numbers on the dice is 4' .

Solution. Let X and Y be the random variables denoting the number which comes up on Die1 and Die2 respectively.

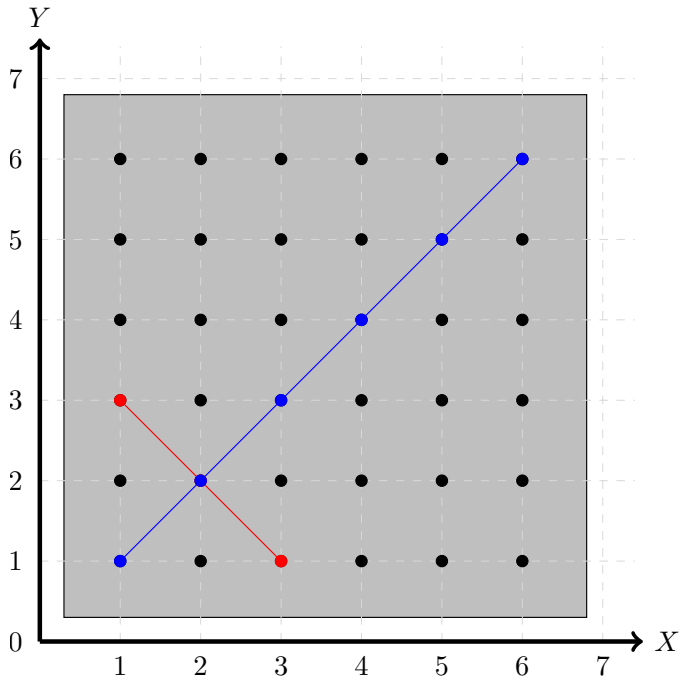

Fig. 1. $X + Y = 8|Y < 4$

$$\Pr(X + Y = 4|X \neq Y) = \frac{\Pr(X + Y = 4, X \neq Y)}{\Pr(X \neq Y)} \quad (1)$$

Probability of an event E, written as $\Pr(E)$

$$\Pr(E) = \frac{\text{Number of outcomes favourable to } E}{\text{Total Number of possible outcomes}} \quad (2)$$

$$\Pr(X \neq Y) = 1 - \frac{\text{Number of blue dots } (X, Y)}{36} \quad (3)$$

$$= 1 - \frac{(6) \cdot (1)}{36} \quad (4)$$

$$= \frac{5}{6} \quad (5)$$

$$\Pr(X + Y = 4, X \neq Y) = \frac{\text{Number of red dots } (X, Y)}{36} \quad (6)$$

$$= \frac{2}{36} \quad (7)$$

$$= \frac{1}{18} \quad (8)$$

$$\Pr(X + Y = 4|X \neq Y) = \frac{\left(\frac{1}{18}\right)}{\left(\frac{5}{6}\right)} \quad (9)$$

$$\therefore \Pr(X + Y = 4|X \neq Y) = \frac{1}{15} \quad (10)$$