

# Assignment 7

Manikanta Uppulapu

May 19, 2022

# Outline

1 Problem Statement

2 Given

3 Solution

# Problem Statement

## 13.2 Q5 [NCERT 12]

A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let  $A$  be the event, 'the number is even,' and  $B$  be the event, 'the number is red'. Are  $A$  and  $B$  independent?

# Given

Let's denote the situation of the problem by random variable  $X$  such that  $X \in \{0, 1, 2, 3\}$  where,

Variable	Event
$X = 0$	The number is odd
$X = 1$	The number is even
$X = 2$	Colour of side is green
$X = 3$	Colour of side is red

Table 1

# Probabilities

probability	value
$\Pr(X = 0)$	$\frac{1}{2}$
$\Pr(X = 1)$	$\frac{1}{2}$
$\Pr(X = 2)$	$\frac{1}{2}$
$\Pr(X = 3)$	$\frac{1}{2}$
$\Pr(X = 1, 3)$	$\frac{1}{6}$

Table 2: Probability values

# Solution

## Theorem

Two sets, say A and B, are independent if  $P(AB) = P(A)P(B)$

## Conclusion

$$\Pr(X = 1) \Pr(X = 3) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \neq \frac{1}{6} \neq \Pr(X = 1, 3).$$

Therefore, the two sets are not Independent.