

ASSIGNMENT 1

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CS22BTECH11043

Exempler:10.13.2.13 - If I toss a coin 3 times and get head each time, should I expect a tail to have a higher chance in the 4th toss? Give reason in support of your answer. Hence there is equal chance for head and tail on 4th coin toss.

Solution:No.Because each coin toss is independent.

TABLE 0
DEFINING RANDOM VARIABLES X AND Y

Random Variable	Definition	Value
X	Number of heads achieved in first 3 coin tosses	0
		1
		2
		3
Y	Getting head on 4 th coin toss	1
	Getting tail on 4 th coin toss	0

$X \sim B(3, p)$

$p = \text{Probability of head} = \frac{1}{2}$

Since X occurs before Y, X is independent of Y

$$\Pr(Y = 1 | X = 3) = \frac{\Pr(Y = 1, X = 3)}{\Pr(X = 3)} \quad (1)$$

$$= \frac{\Pr(X = 3) \Pr(Y = 1)}{\Pr(X = 3)} \quad (2)$$

$$= \Pr(Y = 1) \quad (3)$$

$$= 0.5 \quad (4)$$

$$\Pr(Y = 0 | X = 3) = \frac{\Pr(Y = 0, X = 3)}{\Pr(X = 3)} \quad (5)$$

$$= \frac{\Pr(X = 3) \Pr(Y = 0)}{\Pr(X = 3)} \quad (6)$$

$$= \Pr(Y = 0) \quad (7)$$

$$= 0.5 \quad (8)$$