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 4^{th} toss? Give reason in support of your answer.

Solution: No.Because each coin toss is independent.

TABLE 0
DEFINING RANDOM VARIABLES X AND Y

Random variable	Definition
X	number of heads achieved in first 3 coin tosses
Y	number of heads achieved in 4 coin tosses

X = B(3,p)
Y = B(4,p)
p = Probability of head = $\frac{1}{2}$

$$\Pr\left(Y = 4 \mid X = 3\right) = \Pr\left(\frac{Y=4 \cap X=3}{X=3}\right) = \frac{\binom{4}{4}\frac{1}{2}^4}{\binom{3}{3}\frac{1}{2}^3}$$
$$= 0.5$$

$$\Pr\left(Y = 3 \mid X = 3\right) = \Pr\left(\frac{Y=3 \cap X=3}{X=3}\right) = \frac{\binom{3}{3}\frac{1}{2}^4}{\binom{3}{3}\frac{1}{2}^3}$$
$$= 0.5$$

Hence there is equal chance for head and tail on 4^{th} coin toss.