

ASSIGNMENT 1

N.Keerthana
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.

Solution:No.Because each coin toss is independent.

Let

$X = B(3,p)$: defined on first 3 coin tosses.

$Y = B(4,p)$: defined on first 4 coin tosses.

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

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

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

Hence there is equal chance for head and tail on 4th coin toss. Download