

ASSIGNMENT 1

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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.

TABLE 0
DEFINING RANDOM VARIABLES X AND Y

Random variable	Definition
X	number of heads achieved in first 3 coin tosses
Y	Y = 1 if 4 th coin toss is head and 0 if tail

$X \sim B(3, p)$

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

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

$$= \frac{\binom{3}{3} \frac{1}{2}^4}{\binom{3}{3} \frac{1}{2}^3} = 0.5 \quad (2)$$

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

$$= \frac{\binom{3}{3} \frac{1}{2}^4}{\binom{3}{3} \frac{1}{2}^3} = 0.5 \quad (4)$$

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