# AI1110 Assignment 1

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EE22BTECH11215

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**Question: 10.13.2.12** Sushma tosses a coin 3 times and gets tail each time. Do you think that the outcome of next toss will be a tail? Give reasons.
**Solution:** As the coin is tossed 3 times and gets a tail each time but it is not necessary that 4th time will be a tail. It may be either tail or head in any further toss.

Let X be the random variable for the occarance of tail. In this binomial distribution, $n = 4$.

$$\Pr(X = r) = {}^{n}C_r p^r (q)^{n-r} \tag{1}$$

where,

$$X \in \{0, 1, 2, 3, 4, 5\} \tag{2}$$

$p = q = \frac{1}{2}$.

$$\Pr(X = 0) = {}^{4}C_0 \left(\frac{1}{4}\right)^0 \left(\frac{1}{4}\right)^4 \tag{3}$$

$$\Pr(X = 1) = {}^{4}C_1 \left(\frac{1}{4}\right)^1 \left(\frac{1}{4}\right)^3 \tag{4}$$

$$\Pr(X = 2) = {}^{4}C_2 \left(\frac{1}{4}\right)^2 \left(\frac{1}{4}\right)^2 \tag{5}$$

$$\Pr(X = 3) = {}^{4}C_3 \left(\frac{1}{4}\right)^3 \left(\frac{1}{4}\right)^1 \tag{6}$$

$$\Pr(X = 4) = {}^{4}C_4 \left(\frac{1}{4}\right)^4 \left(\frac{1}{4}\right)^0 \tag{7}$$

As the coin in unbiased, Probability of $Head = Tail = \frac{1}{2}$ in every single case. Hence, the given statement is false.