Assignment 1

CS22BTECH11043
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exempler,10.13.2.13: Question. 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. There is equal chance for both head and tail in the 4^{th} coin toss.

Reason:

Let A be the event that first 3 coin tosses are heads.
Let B be the event that 4^{th} coin toss is tail.

Now let us find P(B/A) and P(B).

1.P(B/A) : When the first 3 tosses are heads there are 2 possibilities HHHT and HHHH.
So P(B/A) = 0.5

2.P(B) :

Last toss can either be a head or a tail.

Case-1 : Last toss is head

First three tosses have 2 possibilities each of either head or tail.So total number of possibilities = 2x2x2 = 8.

Case-2 : Last toss is tail

Similarly this case also has 8 possibilities.

So P(B) = $\frac{8}{8+8}$ = 0.5

Since P(B/A) = P(B) B is independent of A.So there is equal chance for head and tail of 0.5 in 4^{th} coin toss independent of first 3 tosses.