

Data605-Week6-Discussion6-Kamath

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Exercise- CONDITIONAL PROBABILITY - #2

2 A coin is tossed three times. What is the probability that exactly two heads occur, given that

- (a) the first outcome was a head?
- (b) the first outcome was a tail?
- (c) the first two outcomes were heads?
- (d) the first two outcomes were tails?
- (e) the first outcome was a head and the third outcome was a head?

Solution:

A Coin can land as Head (H) or Tail (T); two choices. With three tosses, we can have below combinations

$2 \times 2 \times 2 = 8$ combinations as below

1. H H H
2. H H T
3. H T H
4. H T T
5. T H H
6. T H T
7. T T H
8. T T T

We can now solve the below as:

What is the probability that exactly two heads occur, given that

(a) the first outcome was a head?

==> We have **two** combinations with exactly two heads with first outcome as head - H H T and, H T H

==> $P(a) = 2/8 = 0.25$

(b) the first outcome was a tail?

==> We have **one** combination with exactly two heads with first outcome as tail - T H H.

=> $P(b) = 1/8 = 0.125$

(c) the first two outcomes were heads?

=> We have **one** combination with exactly two heads with first two outcomes as heads - H H T.

=> $P(c) = 1/8 = 0.125$

(d) the first two outcomes were tails?

=> We will have **zero** combinations with exactly two heads with first two outcomes as tails.

=> $P(d) = 0/8 = 0.0$

(e) the first outcome was a head and the third outcome was a head?

=> We have **one** combinations with exactly two heads with first and the third outcome as a head - H

=> $P(e) = 1/8 = 0.125$
