

COSM chapter-4

Probability

① steps	outcomes
1	3
2	2
3	4

How many experimental outcomes exists for the entire experiment?

$$\rightarrow \text{Total experimental outcomes} = 3 \times 2 \times 4 \\ = 24 \text{ Outcomes}$$

② How many ways can three items be selected from a group of six items?

$$\rightarrow {}^6C_3 = \frac{6!}{3!(6-3)!} = \frac{6 \times 5 \times 4}{3 \times 2} = 20$$

There are 20 ways to select 3 items from a group of 6 items

Given A, B, C, D, E & F are 6 items

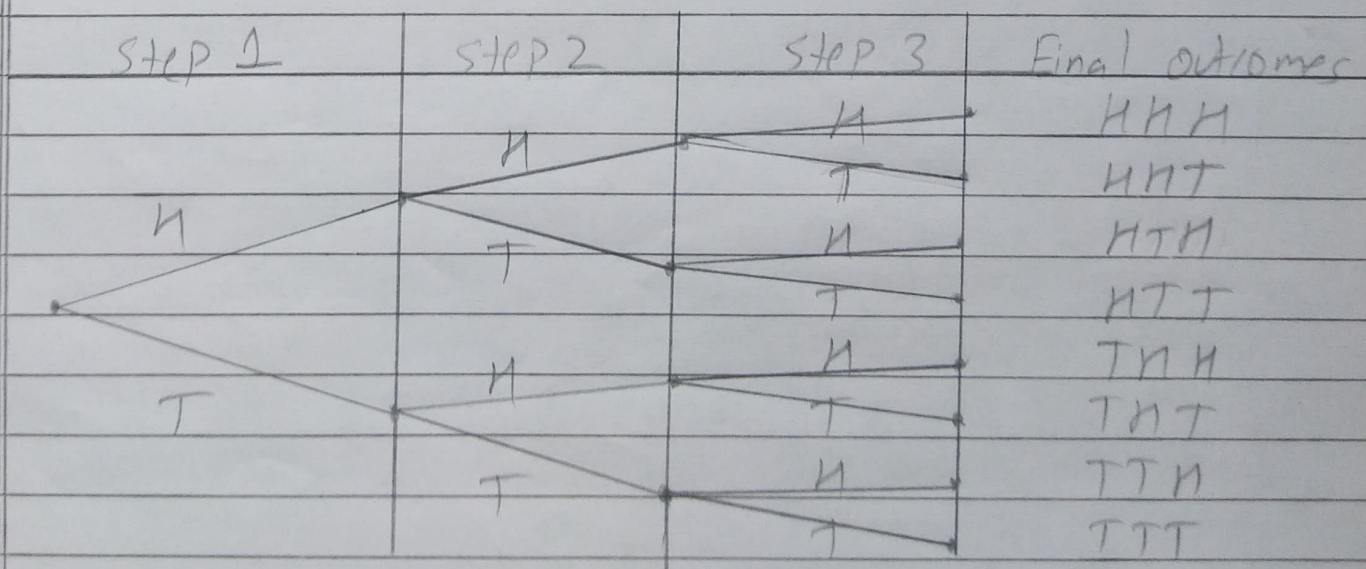
Combinations : $\{ (ABC), (ACD), (ADE), (AEF), (ABD), (ABE), (ABF), (DB, F), (ACE), (ACF), (ADF), (BCD), (BDE), (BEF), (BCF), (BLE), (BDF), (CDE), (CDF), (DEF), (CEF) \}$

(3) How many permutations of 3 items can be selected from a group of 6

$$\rightarrow {}^6P_3 = \frac{6!}{(6-3)!} = 6 \times 5 \times 4 = 120$$

There are 120 permutations of 3 items can be selected from a group of 6

(4) Tree Diagram



(b) Experimental outcomes

↳

(nnn), (nnt), (nth), (ntt)
(tnt), (tnt), (tth), (ttt) }

(c) Probability for each experiment outcome is $\frac{1}{8}$.

(5) Outcomes : E_1, E_2, E_3, E_n, E_5

Assigning Probabilities :

Probability for E_1 to occur $= \frac{1}{5} = 0.2$
Similarly for E_2, E_3, E_n and $E_5 = 0.2$

that satisfies equation 4.3 which says each experimental outcomes is always between 0 and 1

$$\text{ie. } 0 \leq P(E_i) \leq 1 \text{ for all } i$$

Also, adding probability of each experiments outcomes gives $0.2 + 0.2 + 0.2 + 0.2 + 0.2 = 1$

that satisfies equation 4.4 which says 'sum of probabilities of all the experimental outcomes is equal to 1.0'

$$\text{ie. } P(E_1) + P(E_2) + \dots + P(E_n) = 1$$

⑥ Experiment outcomes

E1	20
E2	13
E3	17
	<hr/> 50

Assigning Probabilities:

$$E1 = 20/50 = 0.4$$

$$E2 = 13/50 = 0.26$$

$$E3 = 17/50 = 0.34$$

here, 'relative frequency method' is used as the data are available to estimate the proportion of occurrence.

⑦ Given Subjectively assigned probability.

$$P(E1) = 0.10$$

$$P(E2) = 0.15$$

$$P(E3) = 0.40$$

$$P(E4) = 0.20$$

The subjectively assigned probabilities are not valid because it must satisfy two basic requirement of equation (4.3) and (4.4)

$$P(E1) + P(E2) + P(E3) + P(E4) = 0.81$$

Also the sum of all probability for the experimental outcomes is not 1, it is not valid.