

239. 20th May 2024

STA 211/MT #2/9

Counting Techniques.

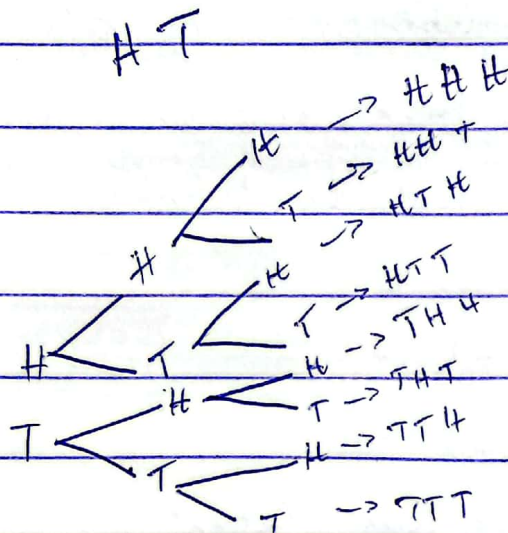
In a dept fb team 3 players.

selected to faculty, order \rightarrow important

Gutules south south, select 2 states 1 2 3

Assume a coin 3 times

Number of out comps = ?

$$2 \times 2 \times 2$$


Combback gone wrong.

Tree diagrams are manageable as long as the number of outcomes is not large.

If there are many utases to

an experiment and several possibilities at

each stage, the tree diagram associated with will become

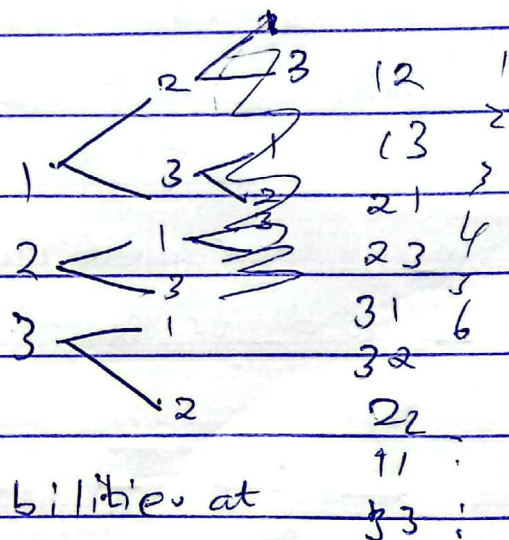
too large to manage. For such problems, the counting of the

outcome is simplified by means of algebraic formula's.

The commonly used formula is the fundamental principle of

Counting, also known as the multiplication rule of counting

which states as follows: If a choice consists of k -steps of which



the step, can be made in n_1 ways. for each of these, the second can be made in n_2 ways, and so on, and for each of these, the k th can be made in n_k ways, then the whole choice can be made in $n_1 \cdot n_2 \cdot n_3 \cdot \dots \cdot n_k$ ways.

~~And so, each of these, the k th can be made in n_k ways.~~

Example: The following 3 factors were considered in the study of the effectiveness of a certain cancer treatment.

(i) Medicine (A_1, A_2, A_3, A_4, A_5) 5

(ii) Dosage Level (Low, Medium, High) 3

(iii) Dosage Frequency (1, 2, 3, 4, times/day) 4

Find the number of ways that the cancer patient can be given the medicine.

How many license plate numbers with three (3) letters followed by 3 digits exist? Repetition of either letter or digits is permitted.

26 ~~26~~ ~~26~~ 10 ~~10~~ ~~10~~ 8999

Repetition is allowed.

How many numbers in the range $10^3 \rightarrow 9999$

9 9 9 9

1,757,600 / 3
527,200

How many license plate numbers with 3 letters followed by 3 digits exist if exactly one of the digits is 1? Repetition is allowed.

1	2	3	4	5
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1. Five different books are on a shelf, in how many different ways could you arrange them. 120
2. How many license plate numbers are there that start with 3 letters followed by 4 digits if repetitions are not allowed?
3. How many 5 digit zipcodes can be made where all digits are different
4. Find m and n such that ${}^m P_n = \frac{9!}{6!}$ $m=9$
 $n=3$
5. How many different strings can be made from the letters in mississippi using all the letters $\frac{10!}{4!4!}$
6. The university of Benin staff club has 6 members.
In how many ways:
 - (a) Can all 6 members line up for a picture
 - (b) In how many ways can they choose a president and a secretary. ${}^6 P_2$
 - (c) How many ways can they choose 3 members to attend a state conference with no regard to order. ${}^6 P_3$.

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Exercises

1. Consider the experiment of rolling two dice. How many events A are there with $P(A) = \frac{1}{2}$?
2. A store has 80 Power banks in its inventory, 30 are Samsung product while the remaining are LG products. Of the Samsung Power Bank 20% are defective and 8% of the LG products are defective. Calculate the probability that exactly two out of a random sample of 5 power banks from the store inventory are defective.
3. Suppose there is 40% chance of getting a freezing rain, 10% chance of snowing and freezing rain, 80% chance of snow or freezing rain. Find the chance of snow.
4. An Urn contains 2 red balls, 4 blue balls and 5

21.5

White balls

(a) What is the probability of the event R , that a ball drawn at random is Red.

(b) What is probability of event ' $\text{not } R$ '.

(c) What is the probability that a ball drawn at random is either Red or White.

5 If two fair dice are rolled find the probability that the sum of the two faces is 6 given that the two dice are showing different faces.