Probability vs. Statistics

Different subjects: both about random processes

Probability

* Logically self-contained
* A few rules for computing probabilities
* One correct answer
* More mathematical, more fundamental

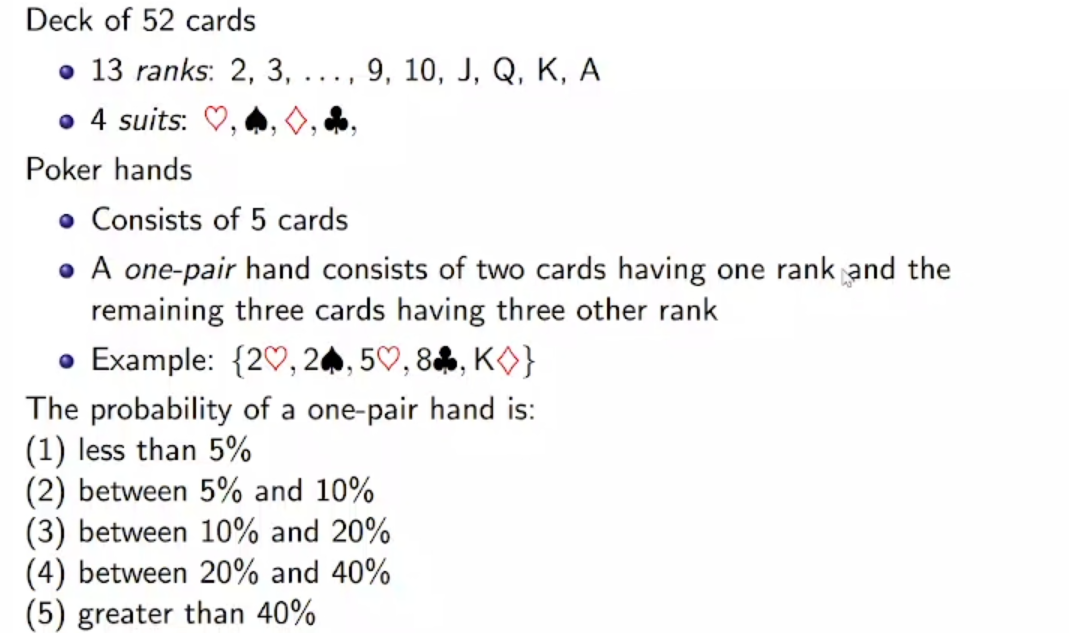
Statistics

* Messier and more of an art
* Get experimental data and try to draw probabilistic conclusions
* No single correct answer
* Application of probabilty

Counting: Motivating Examples

What is the probability of getting exactly 1 heads in 3 tosses of a fair coin?

Poker Hands



Sets in Words



Sample space is just a set mathematically.

Set has some certain properties. It is not a random collection of things.

Visualize Set Operations with Venn Diagrams

Diagram, shape, venn diagram, circle

Description automatically generated

Intersection elements will be counted twice if you count the numbers. When you write as a set, you write them once.

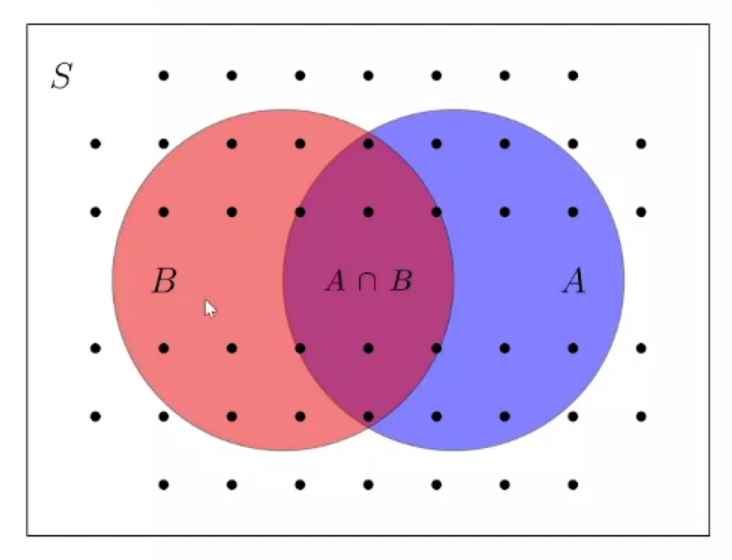
U 🡪 cup 🡪 cap

Product of sets (we increase the dimension):

Text

Description automatically generated with low confidence

Inclusion-Exclusion Principle



s(A U B) = s(A) + s(B) – s(A B)

Board Question

Graphical user interface, text, application

Description automatically generated

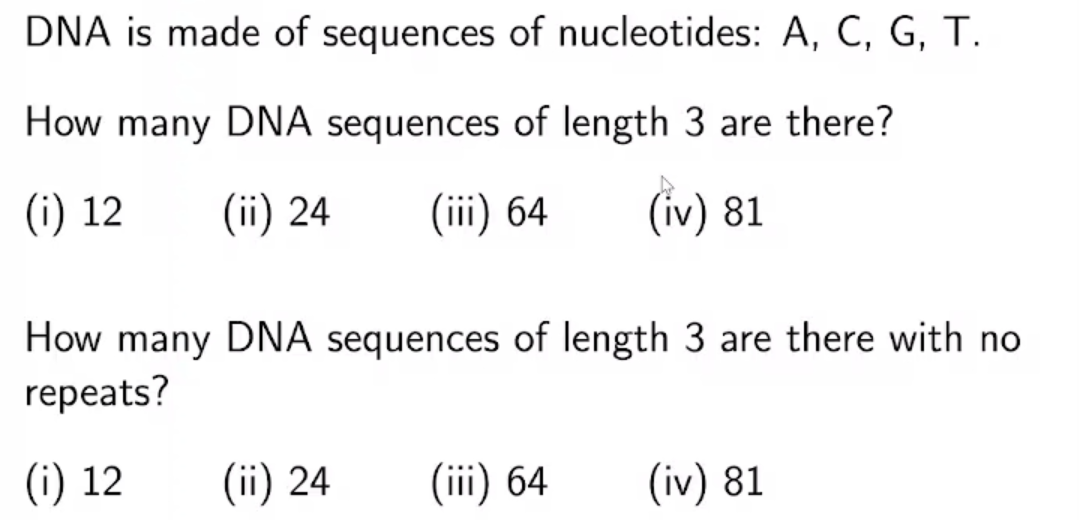
7 + 4 – 2 = 9

Rule of Product

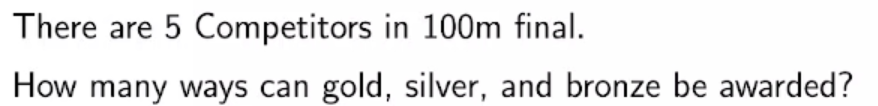
3 shirts, 4 pants = 12 outfits

(More powerful than it seems.)

Concept Question: DNA

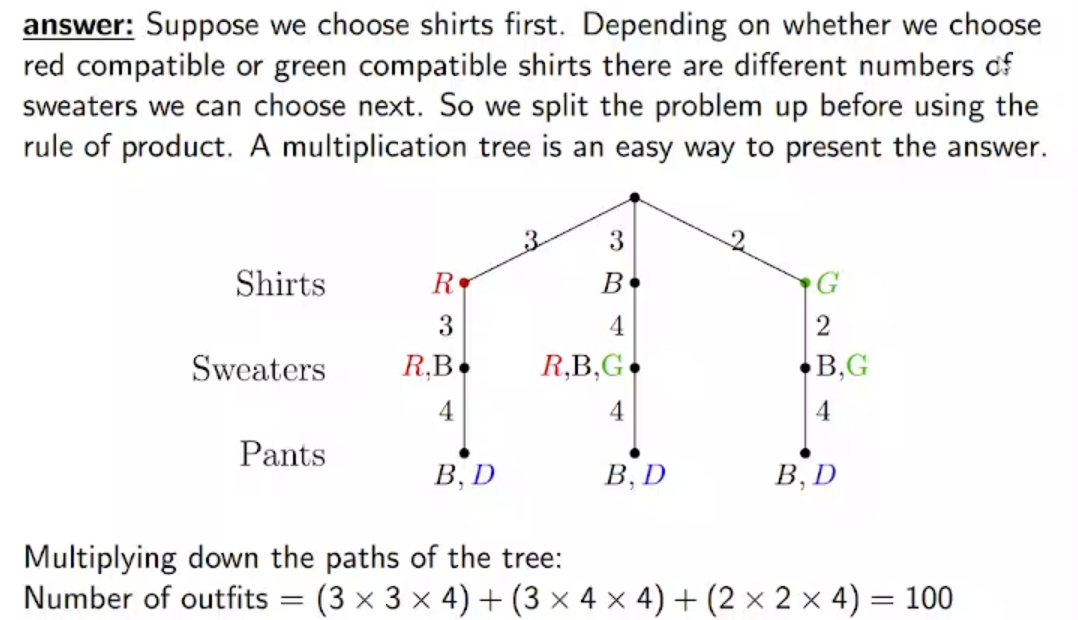


Board Question 1



Board Question 2





number of red shirts