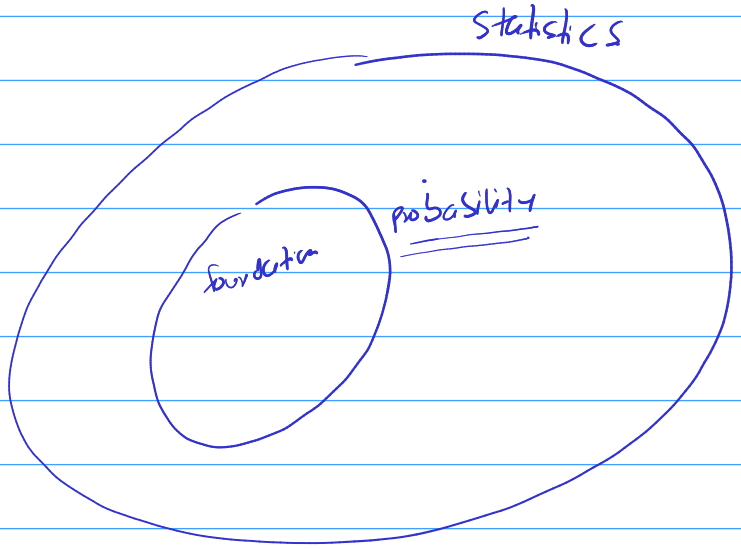
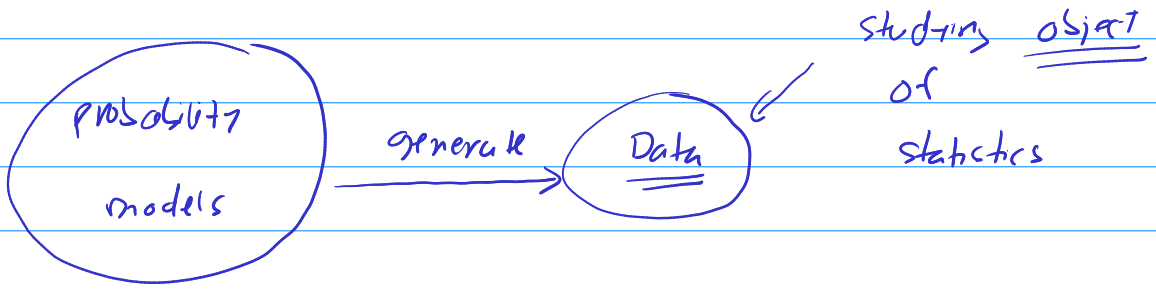




If we understand the models that generate the data, then we can better understand the data.

We will next study probability!

Random Variables

Example: Consider an experiment of tossing a fair coin one time. The coin has two sides H and T. What are all possible outcomes?

There are only 2 possible outcomes: H and T.

Since the coin is fair, the chance of these two possible outcomes are the same and are 50% or 1/2.

Let X be the number of Tail observed.

What are possible values for X?

X = 0 (when the coin lands "H")

X = 1 (when the coin lands "T")

The prob. of X being 0 is 50% or 1/2

The prob. of X being 1 is 50%

we write:

$$X = \{0, 1\}$$

$$P(X=0) = 1/2$$

$$P(X=1) = 1/2$$

Reads: prob. of X = 1

we can also write:

X	0	1
$P(x)$	$1/2$	$1/2$

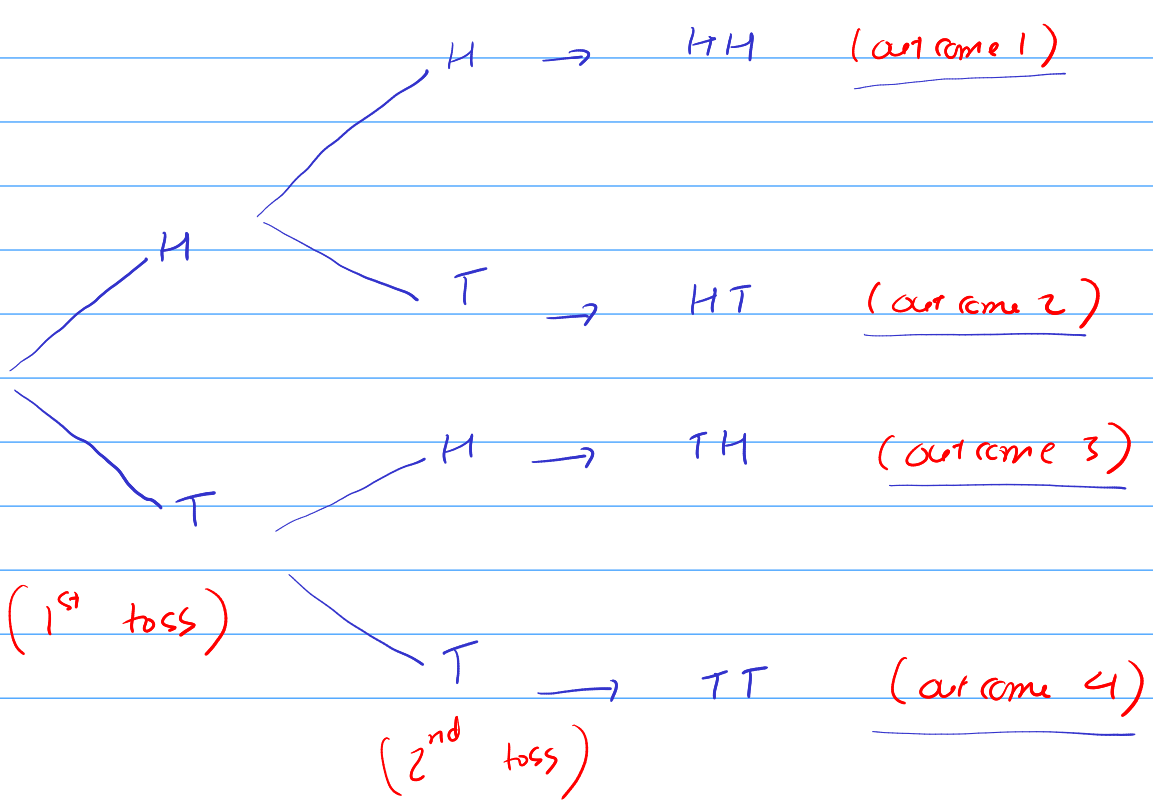
X is a random variable.

$P(x)$ is a prob. distribution of X.

Example:

Let X be the number of tails in the experiment of tossing a fair coin 2 times.

write the prob. distribution of X.

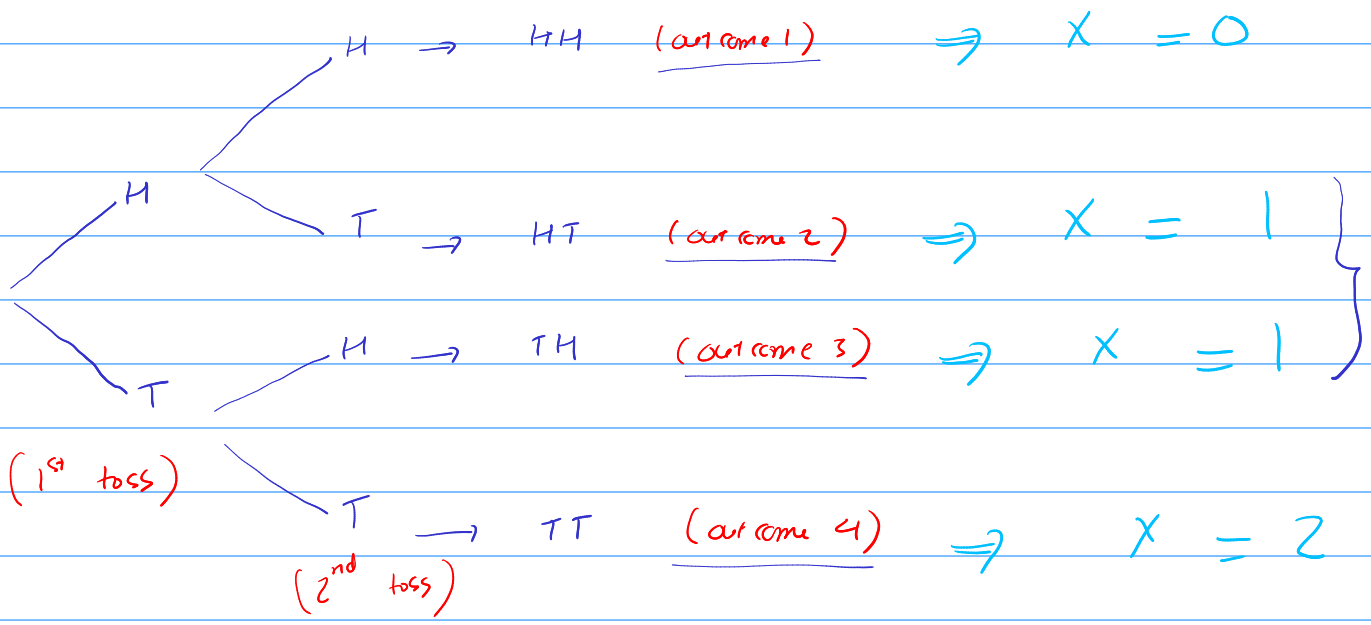


We have 4 possible outcomes when tossing the coins 2 times.

They are: $\{HH, HT, TH, TT\}$

The prob. of each of these outcomes is 1/4 or 25%

Let convert all of these outcomes to the value of X.



$$P(X=0) = P(HH) = 1/4$$

$$P(X=1) = P(TH) + P(HT) = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

$P(X = 2) = P(TT) = 1/4$

Therefore the prob. distribution of X is.

X	0	1	2
P(x)	1/4	1/2	1/4

Assignment 14

Consider an experiment of tossing a fair coin three times and let X be the number of times we observe Tail. Find the probability distribution of X.