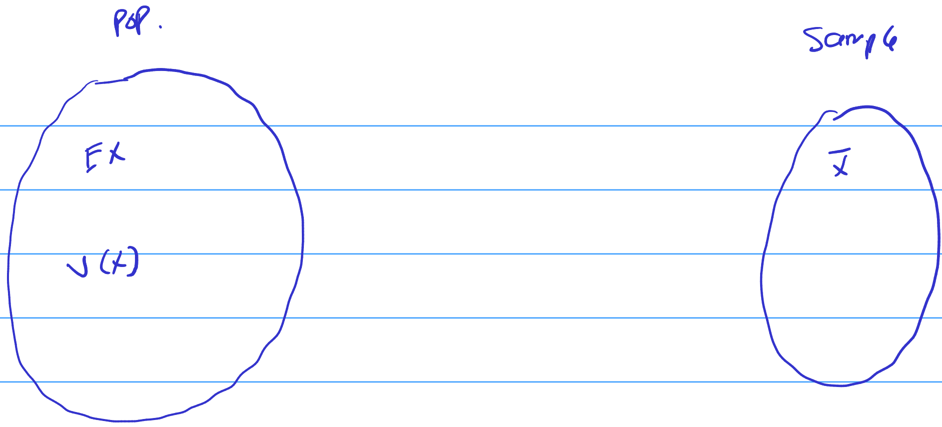

Pop. mean $\xleftrightarrow[\text{the same}]{\text{very much}}$ Sample mean

Variance mean $\longleftrightarrow$ Sample variance

In general, if the sample size (the number of data points in the sample) goes to infinity,

then: sample mean approaches pop. mean

and sample variance approaches pop. variance

⊛ Binomial Distribution.

Consider an experiment of tossing a coin. 100 times.

Let X be the number of times you get tail.

X is a binomial distribution.

consider of a sequence of independent and identical experiments where each experiment has only 2 outcomes: Success and Failure.

(S) and (F)

let X be the number of success.

let p be the prob of success.

X is called a binomial distribution.

$$X \sim \text{Binomial}(p, n)$$

p: chance of success

n: number of trials.

<u>Example</u>:

X is the number of tail when tossing a fair coin 20 times.

$$X \sim \text{Binomial}(\underline{p = .5}, \underline{n = 20})$$

Some Questions:

① $EX = ?$ $\quad V(X)\ ?$

② $P(X = 7) = ?$

$X \sim \text{Binomial}(n, p)$

① $E(X) = n \cdot p$

② $V(X) = n \cdot p(1-p)$

③ $P(X = k) = \underbrace{\binom{n}{k}}_{n \text{ choose } k} p^k (1-p)^{n-k}$

$$\binom{n}{k} = \frac{n!}{k!\,(n-k)!}$$

$m! = 1 \cdot 2 \cdot 3 \cdot 4 \cdots m$

(m factorial)