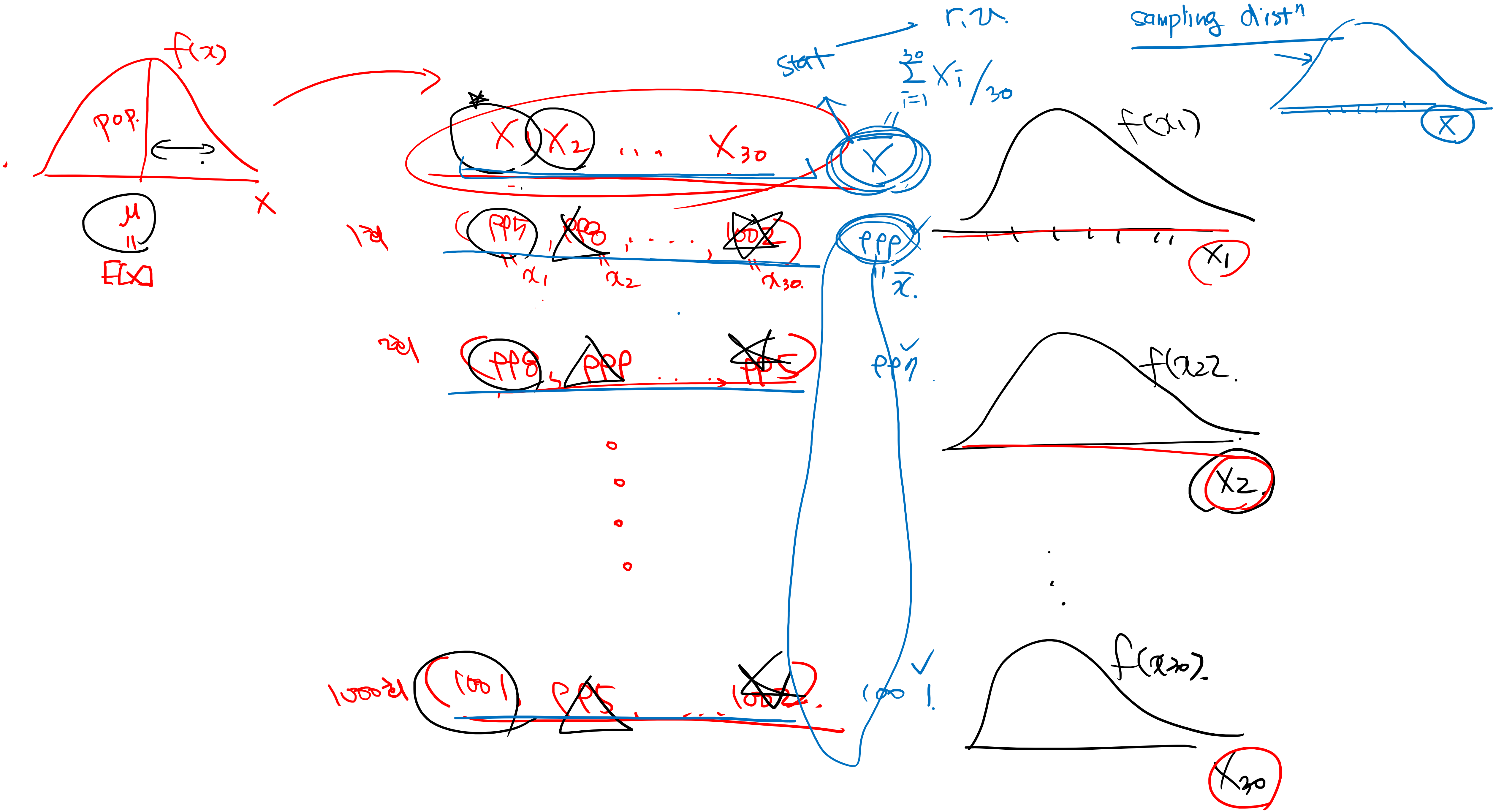
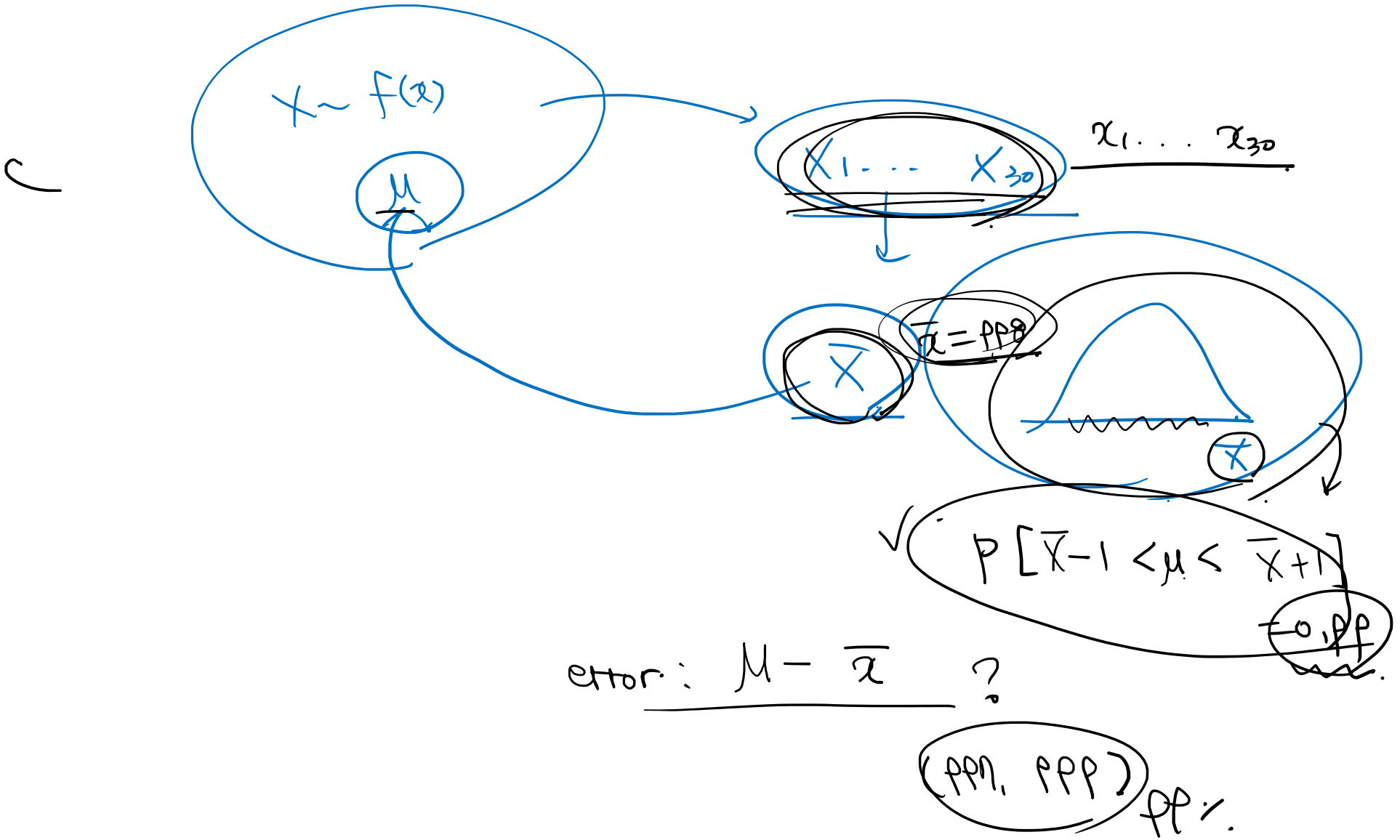
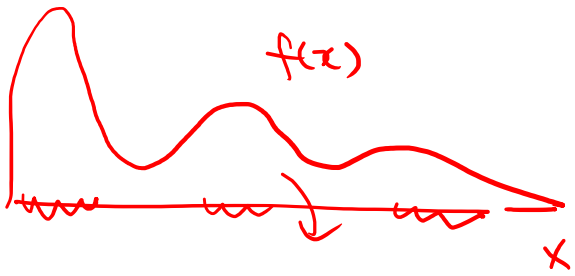
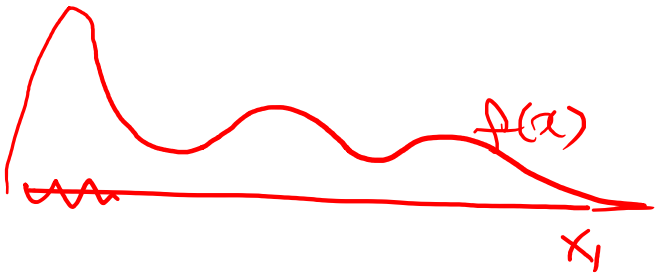


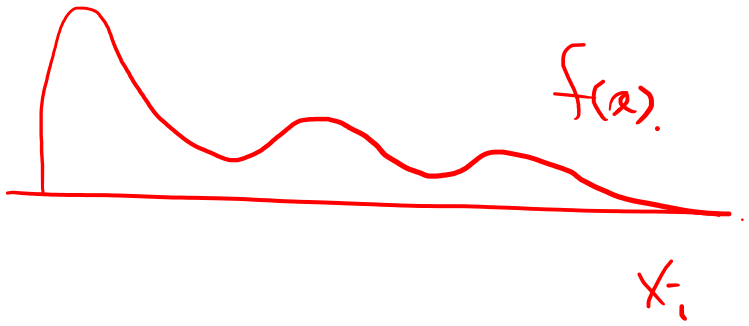
f(x)
pop.
μ
E[X]
X
X1
X2
X30
stat
r.v.
Σ Xi / 30
sampling dist^n
1회
2회
1000회
x1
x2
x30
f(x1)
f(x2)
f(x30)
X1
X2
X30

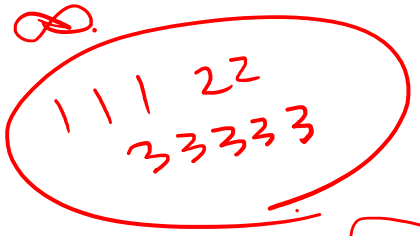

X ~ f(x)
μ
X1 ... X30
x1 ... x30
X̄ = ppp
X̄
P[X̄-1 < μ < X̄+1]
0,pp
error: μ - x̄ ?
(ppn, ppp) pp%

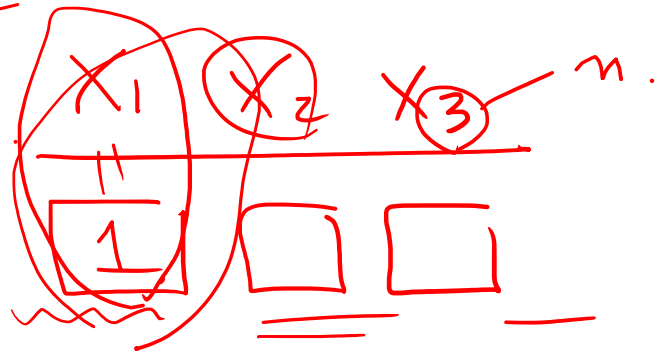


$X_1 \cdots X_{30}$









$X_1 \ldots X_n$ iid $f(x)$ μ, σ^2

① $X_i \sim f(x)$ identical. $i = 1 \ldots n$.

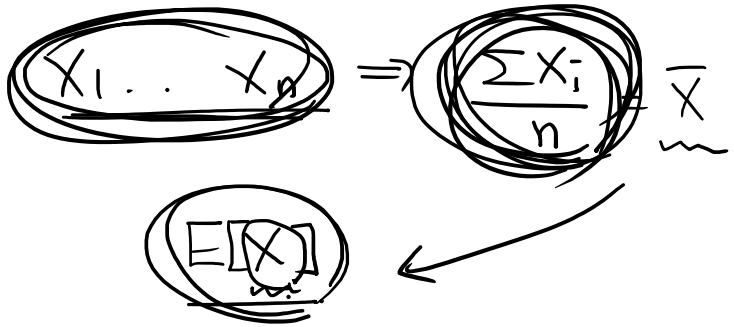
$E[X_i] = \mu$. $V[X_i] = \sigma^2$.

② $X_1 \ldots X_n$ indep.

$$E[\bar{X}] = E\left[\frac{\sum_{i=1}^{n} X_i}{n}\right]$$

$$= \frac{1}{n} E\left[\sum_{i=1}^{n} X_i\right] = \frac{1}{n} \sum_{i=1}^{n} \underbrace{E[X_i]}_{\mu} = \frac{n\mu}{n} = \mu$$

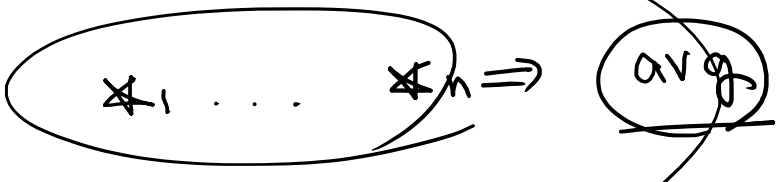
$$V[\bar{X}] = V\left[\frac{\sum_{i=1}^{n} X_i}{n}\right] = \frac{1}{n^2} V\left[\sum_{i=1}^{n} X_i\right] \overset{\text{indep } X_1 \ldots X_n}{=} \frac{1}{n^2} \sum_{i=1}^{n} \underbrace{V[X_i]}_{\sigma^2} = \frac{n\sigma^2}{n^2} = \frac{\sigma^2}{n}$$



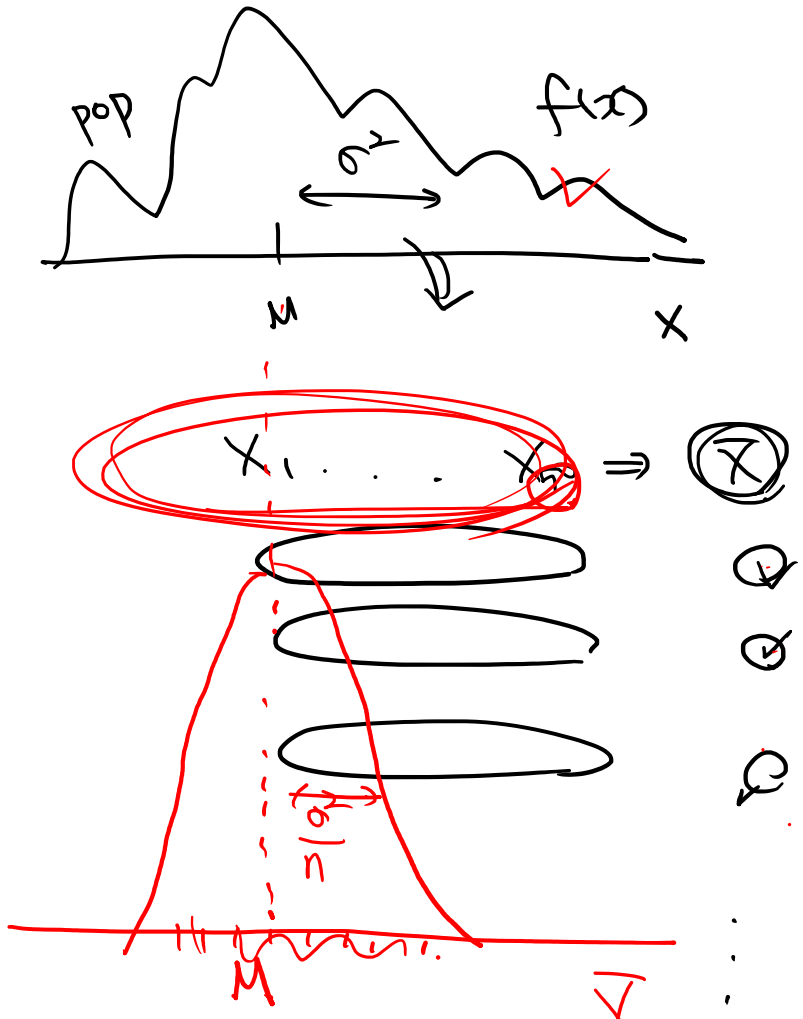
* 대수의 법칙.

$n \to \infty$ $\bar{X} \approx E[X]$

$E[X]$



$n \to \infty$


pop
f(x)
σ^2
μ
$\bar{X}$
$X_1 \ldots X_n$
$\Rightarrow$
$\frac{\sigma^2}{n}$
μ
$\bar{X}$