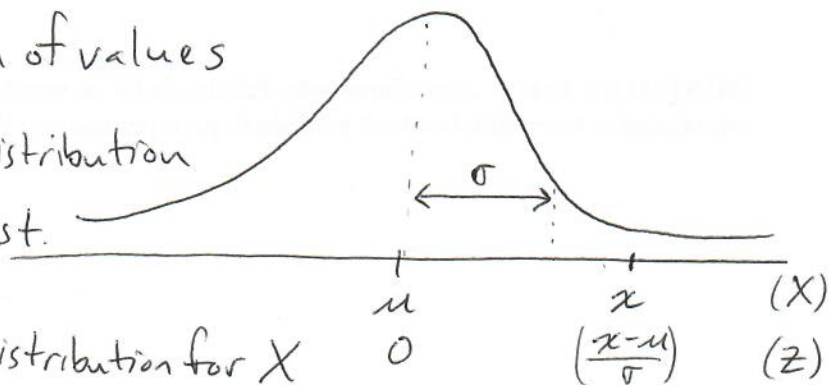$\underset{\sim}{X}$ is a RV with a distribution of values

$E(X) = \mu$ is the mean of the distribution

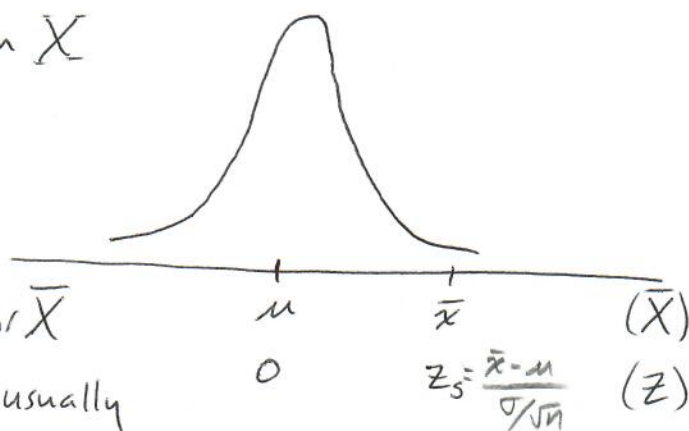$SD(X) = \sigma$ is the SD of the dist.

x is a specific value in the distribution for X

μ x (X)

0 $\left(\frac{x-\mu}{\sigma}\right)$ (Z)

$\bar{X}$ is a RV with less spread than X

$E(\bar{X}) = \mu$

$SD(\bar{X}) = \frac{\sigma}{\sqrt{n}} = \sigma_{\bar{x}}$

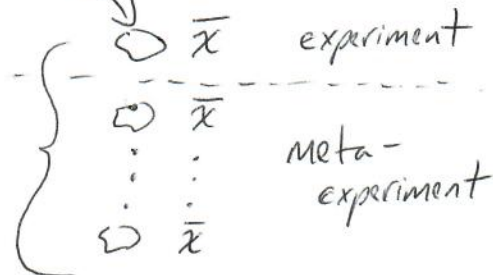$\bar{x}$ is a specific value in the dist. for $\bar{X}$

$\bar{x}$ is the observed sample average, usually

μ $\bar{x}$ $(\bar{X})$

0 $z_s = \frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$ (Z)

population μ

SRS

$\bar{x}$ experiment

$\bar{x}$

$\vdots$ Meta-experiment

$\bar{x}$

$H_0: \mu = 38$ $\bar{x} = 39.1$

$\sigma = 5.6$

$n = 50$

$$P(\bar{X} \geqslant 39.1) = P\left(\frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \geqslant \frac{39.1 - 38}{5.6/\sqrt{50}}\right) = P\left(Z \geqslant \overset{1.39}{\cancel{\times\!\!\times\!\!\times}}\right)$$

RV

(or $\bar{x}_s$)

RV   Z or Z_s

H_0

$(\bar{X})$ 38   39.1

(Z) 0   1.39