CASE 1: when σ is known

- 5% margin of error assumed if not given
- If N given then use FPC also " $\frac{N-n}{N-1}$ "

- Interval Estimate of population mean

→ $\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \times \square$

$(1-\alpha)$: confidence coefficient
α : margin of Error
$\bar{x}$: sample mean
σ : pop std
n : sample size

- $z_{\alpha/2}$ → resembles left area
- $t_{\alpha/2}$ → "

→ Ignore sign

- In Q's margin of error equals either

→ $t_{\alpha/2, v} \frac{s}{\sqrt{n}}$

→ $z_{\alpha} \times \frac{\sigma}{\sqrt{n}}$

CASE 2: when σ unknown

→ $\bar{x} \pm t_{\alpha/2, v} \frac{s}{\sqrt{n}} \times \square$

- $v = n-1$

$(1-\alpha)$: confidence coefficient / level
α : margin of Error
$\bar{x}$: sample mean
s : sample std
n : sample size
v : degree of freedom

Expectation Properties

- $E(a) = a$
- $E(ax+b) = a(E(x)) + b$
- $E(XY) = E(X)E(Y)$
- $E(a^2 X) = a^2(E(X))$

- cov = co-variance

$cov = \sigma_{xy} = E(XY) - E(X)E(Y)$

Properties Variance

- $var(a) = 0$
- $var(ax+b) = a^2 var(x) + \underline{\underline{var(b)}}^{\,0}$
  $= a^2 var(x)$
- $var(X \pm Y) = var(X) \pm var(Y) + 2cov(XY)$

- corr = correlation , range -1 — 1

$corr = r_{xy} = \frac{cov(x,y)}{SD(x)\,SD(y)}$

- -ve : variables inversely proportional
- +ve : variables directly proportional
- 0 : no relation

- If $E(XY) = E(X)E(Y)$, then dependant otherwise independant