分配總整理

NO: 1a

DATE: / /

數学定義　　　　統計應用

sampling distribution

$X \sim N(\mu, \sigma^2)$ 　　　sample mean $\bar{X} \sim N(\mu, \frac{\sigma^2}{n})$

① $Z = \frac{X-\mu}{\sigma} \sim N(0,1)$ 　　　$Z = \frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}} \sim N(0,1)$

② $Z^2 \sim \chi^2_{(1)}$

不是 μ

$\sum_{i=1}^{k} Z_i^2 \sim \chi^2_{(k)}$ ------> $(n-1)\frac{S^2}{\sigma^2} = \sum_{i=1}^{n}\left(\frac{X_i-\bar{X}}{\sigma}\right)^2$

$= \chi^2_{(n)} - \chi^2_{(1)}$

$\sim \chi^2_{(n-1)}$

③ $Y \sim \chi^2_{(k)}$

$\frac{Z}{\sqrt{\frac{Y}{k}}} \sim t_{(k)}$ ------> $\frac{\bar{X}-\mu}{\frac{S}{\sqrt{n}}} = \frac{\frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}}}{\sqrt{\frac{S^2}{\sigma^2}}}$ 　$\rightarrow Z$, $\rightarrow \frac{Y}{n-1}$

$\sim t_{(n-1)}$

④ $Y_1 \sim \chi^2_{(k_1)}$

$Y_2 \sim \chi^2_{(k_2)}$ 　　　(前提 $\sigma_1^2 = \sigma_2^2$)

$\frac{\frac{Y_1}{k_1}}{\frac{Y_2}{k_2}} \sim F_{(k_1, k_2)}$ ------> $\frac{S_1^2}{S_2^2} = \frac{\frac{Y_1}{n_1-1}}{\frac{Y_2}{n_2-1}} \sim F_{(n_1-1, n_2-1)}$

交互関係

$$t = \frac{Z}{\sqrt{\frac{Y}{k}}} \qquad Y \rightarrow \chi^2_{(k)}$$

$$N(0,1) \text{ — } t_{(k)} \text{ — } F_{(k_1,k_2)} \quad \Rightarrow F_{(k,\infty)} \cong \frac{\chi^2_{(m)}}{m}$$

$$t_{(\infty)} \cong N(0,1)$$

$$F_{(1,k)} = t^2_{(k)}$$

$sd(\bar{x})$ 與 $se(\bar{x})$

original population

$$Var(x) = \sigma^2 \longrightarrow \sqrt{Var(x)} = \sigma \quad (sd(x))$$

$$\widehat{Var}(x) = S^2 \; (\hat{\sigma}^2) \longrightarrow \sqrt{\widehat{Var}(x)} = S$$

sample sd of x

sample mean

$$Var(\bar{x}) = \frac{\sigma^2}{n} \longrightarrow \sqrt{Var(\bar{x})} = \frac{\sigma}{\sqrt{n}}$$

$$\sqrt{Var(\bar{x})} = sd(\bar{x})$$

$$\widehat{Var}(\bar{x}) = \frac{S^2}{n} \longrightarrow \sqrt{\widehat{Var}(\bar{x})} = \frac{S}{\sqrt{n}}$$

$$\sqrt{\widehat{Var}(\bar{x})} = se(\bar{x})$$

(sample sd of $\bar{x}$)

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \qquad \frac{\sigma}{\sqrt{n}} \rightarrow sd(\bar{x})$$

$$t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}} \qquad \frac{S}{\sqrt{n}} \rightarrow se(\bar{x})$$