

標本分布のまとめ

1. 標本比率の標本分布：二項分布

特性値

$$E(\hat{p}) = P \quad V(\hat{p}) = \frac{P(1-P)}{n}$$

$$Z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}} \longrightarrow N(0,1)$$

2. 標本平均の標本分布：

特性値

1) 母分散既知

$$E(\bar{x}) = \mu \quad V(\bar{x}) = \frac{\sigma^2}{n}$$

$$Z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} \longrightarrow N(0,1)$$

2) 母分散未知：

$$\text{自由度調整済み分散：} s^2 = \sum_{i=1}^n (x_i - \bar{x})^2 / (n-1) = \frac{nS^2}{n-1}$$

t 統計量

$$T_m = \frac{\bar{x} - \mu}{s / \sqrt{n}} = \frac{\bar{x} - \mu}{S / \sqrt{n-1}}$$

$$\text{特性値：} E(T_m) = 0, \quad V(T_m) = \frac{m}{m-2}$$

3. 標本分散の標本分布

$$\text{特性値：} E(s^2) = \sigma^2, V(s^2) = \frac{2\sigma^4}{n-1}$$

$$\chi^2 \text{ 分布：} \chi^2 = \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{\sigma} \right)^2 = \frac{(n-1)s^2}{\sigma^2} = \frac{nS^2}{\sigma^2}$$

$$\text{特性値：} E(\chi^2) = m, \quad V(\chi^2) = 2m$$